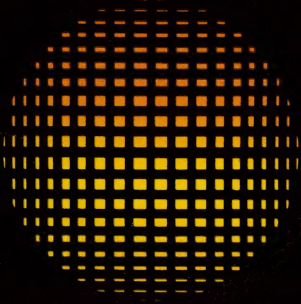
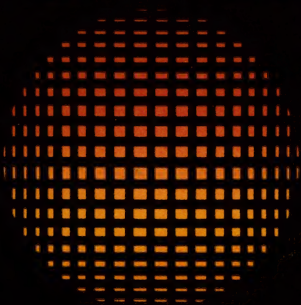
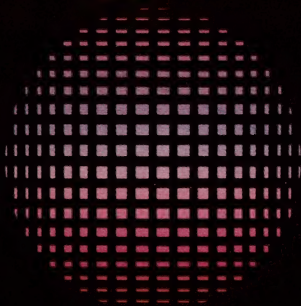

OKIDATA 180

Printer
Handbook

OKIDATA®





Customer Service Guide

for OKIDATA 180

We at OKIDATA strive to provide the most convenient service and support for all our products. With our vast dealer network, you are never far from what you need to keep your printer in tip-top shape.

This handy service guide will tell you how to order parts, ribbons, consumables, accessories and manuals. Information is also given for obtaining service for your printer should you run into trouble. Your printer's warranty and warranty card are also included.



OKIDATA 180

Printer Handbook

Note to Customer

Every effort has been made to ensure that the information in this document is complete, accurate and up-to-date. Mention of software products manufactured by other companies does not necessarily constitute endorsement by OKIDATA. We do not assume responsibility for errors beyond our control, nor can OKIDATA guarantee that changes in the software or equipment made by other manufacturers and referred to in this book will not affect the applicability of information in this book.

Revised edition September 1987.

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IMPORTANT SAFETY INSTRUCTIONS

Your OKIDATA printer has been carefully designed to give you years of safe, reliable performance. As with all electrical equipment, however, there are a few basic precautions you should take to avoid hurting yourself or damaging the printer:

- Read the setup and operating instructions in this handbook carefully. Be sure to save it for future reference.
- Read and follow all warning and instruction labels on the printer itself.
- Unplug the printer before you clean it. Use only a damp cloth; do not use liquid or aerosol cleaners.
- Place your printer on a firm, solid surface. If you put it on something unsteady, it may fall and be damaged; if you place it on a soft surface, such as a rug, sofa, or bed, the vents may be blocked, causing the printer to overheat.
- To protect your printer from overheating, make sure all openings on the printer are not blocked. Don't put the printer on or near a heat source, such as a radiator or heat register. If you put it in any kind of enclosure, make sure it is well ventilated.
- Do not use your printer near water, or spill liquid of any kind into it.
- Be certain that your power source matches the rating listed on the back of the printer. If you're not sure, check with your dealer or with your local power company.
- Your printer has a grounded, 3-prong plug as a safety feature, and it will only fit into a grounded outlet. If you can't plug it in, chances are you have an older, non-grounded outlet; contact an electrician to have the outlet replaced. Do not use an adapter to defeat the grounding.
- To avoid damaging the power cord, don't put anything on it or place it where it will be walked on. If the cord becomes damaged or frayed, replace it immediately. (See the enclosed Customer Service Guide for replacement parts information.)

- If you're using an extension cord or power strip with the printer, make sure that the total of the amperes required by all the equipment on the extension is less than the extension's rating. The total ratings of all equipment plugged into the outlet should not exceed 15 amperes.
- Do not poke anything into the ventilation slots on the sides of the printer; you could get a shock or cause a fire.
- Aside from the routine maintenance described in this handbook, don't try to service the printer yourself; opening the cover may expose you to shocks or other hazards. Don't make any adjustments other than those outlined in the handbook—you may cause damage requiring extensive repair work. The enclosed Customer Service Guide explains how to get your printer serviced by qualified OKIDATA technicians.
- If anything happens that indicates that your printer is not working properly or has been damaged, unplug it immediately and follow the procedures in the Customer Service Guide for having your printer serviced. These are some of the things to look for:
 - The power cord or plug is frayed or damaged.
 - Liquid has been spilled into the printer, or it has been exposed to water.
 - The printer has been dropped, or the cabinet is damaged.
 - The printer doesn't function normally when you're following the operating instructions.



Chapter 1: On Your Mark _____

Before you plug in your new OKIDATA 180 printer, you'll have to do a few set up steps—the first of which is to make sure that you have everything you're supposed to have:

Checking the Contents

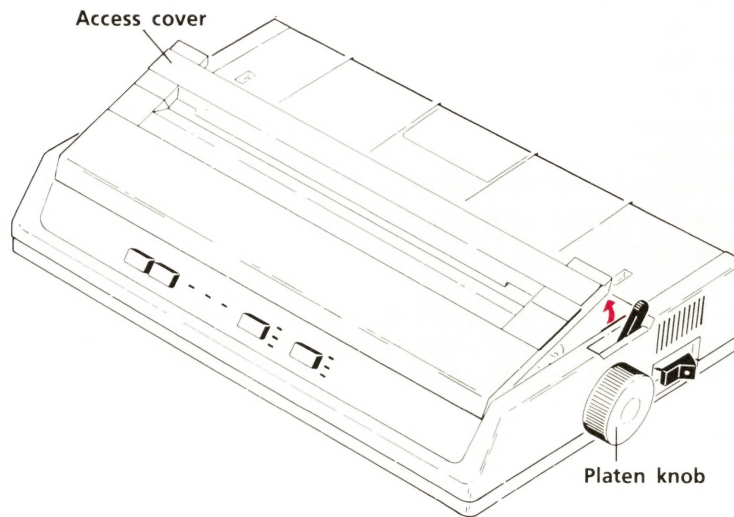
Contents list:

- ☐ OKIDATA 180 printer
- ☐ Ribbon cartridge
- ☐ Platen knob
- ☐ Spare fuses (2)
- ☐ Access cover
- ☐ Paper separator
- ☐ Power cord
- ☐ Commodore® interface cable
- ☐ Centronics parallel interface cable
- ☒ Printer handbook

In addition to the items on the list, you'll be needing paper (see page E-1 for choosing the right paper). If any item is missing or damaged, notify the store where you bought the printer.

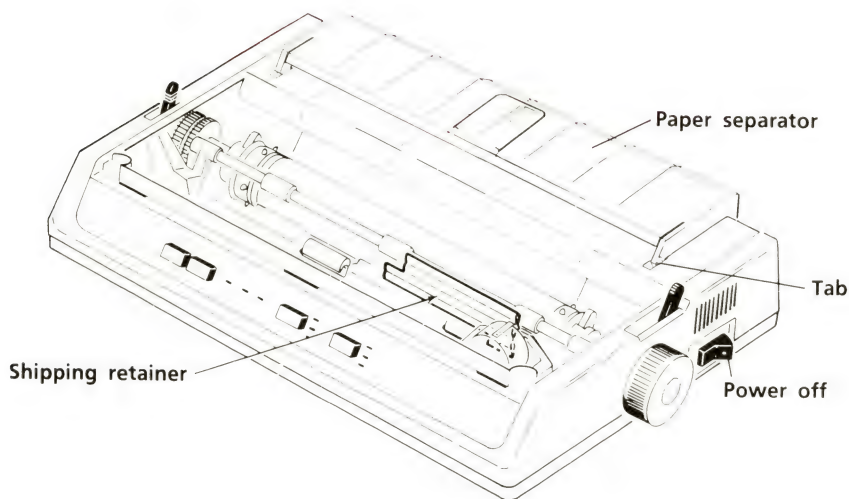
Setting Up the Printer

1. Remove the access cover.
2. Install the platen knob.
 - a. Line the notch on the knob with the pin on the shaft.
 - b. Push in on the knob.



3. Install the paper separator.
 - a. Holding the paper separator parallel to the top of the printer, insert the tabs into the slots.
 - b. Secure the tabs by sliding them towards the back of the printer.
4. Remove the plastic shipping retainer.

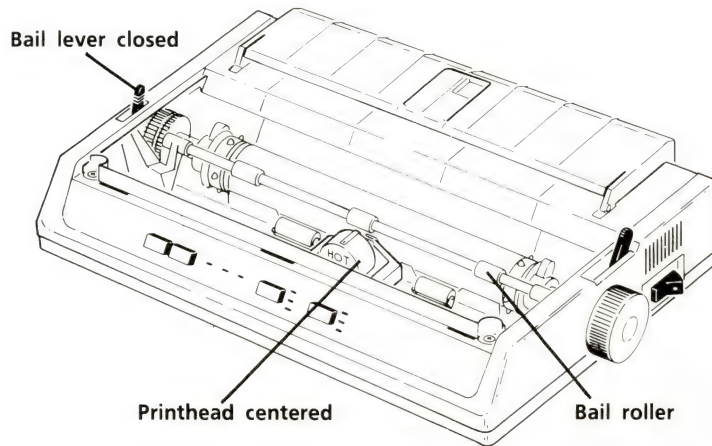
NOTE: Replace the retainer whenever you ship the printer.



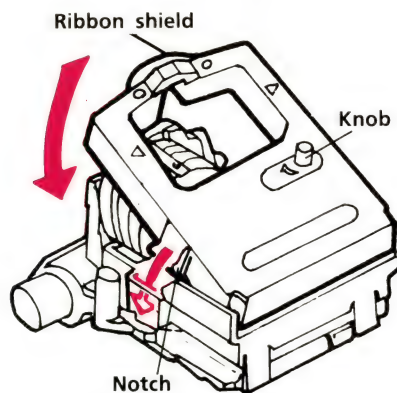
5. Make sure the printer is turned off.
6. Plug the power cord into the printer and into a 3-prong grounded outlet.
7. Be sure the internal switches are properly set for the emulation (Commodore or Epson) you want. See page 17 for details.

Inserting the Ribbon

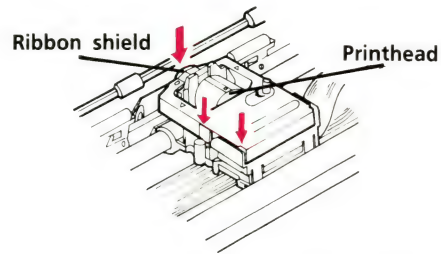
1. Center the printhead away from the bail rollers and keep the bail lever closed.



2. With the blue knob facing up, lower the ribbon cartridge notched end first and then push the end with the ribbon shield over the printhead.



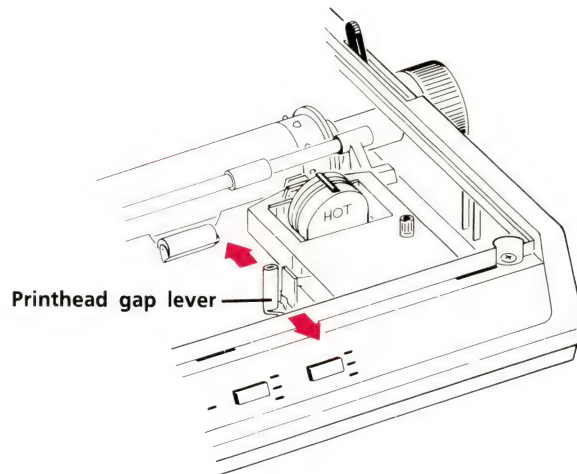
3. Press the ribbon cartridge until it locks into place.



CAUTION: DO NOT remove the clear plastic ribbon shield.

4. Adjust the printhead gap lever according to the type of paper you're using:

- 1 = 1 & 2 part forms
- 2 = 3 & 4 part forms
- 3 = Extra thick paper



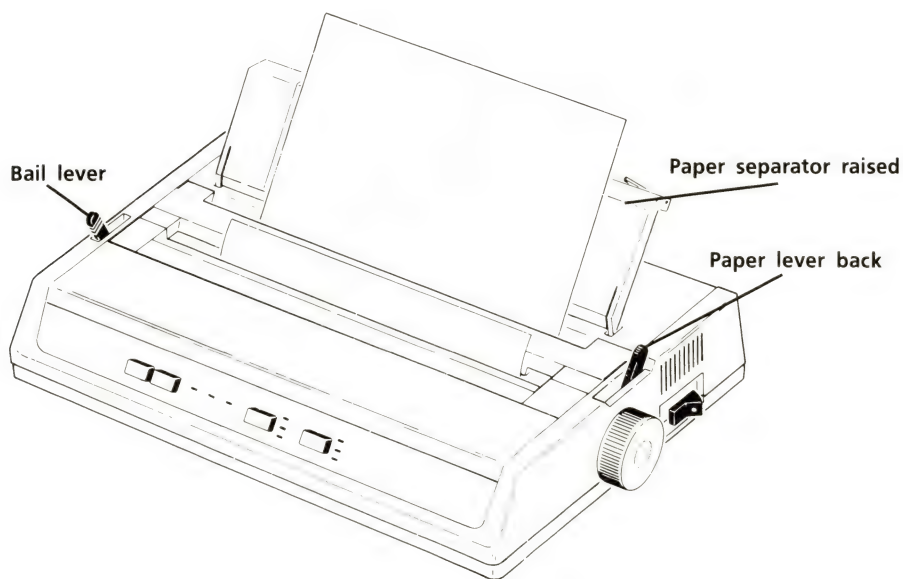
5. Replace access cover.

Loading Paper

You can use either single sheets or continuous form (computer) paper, up to four parts, in your printer.

Single Sheets

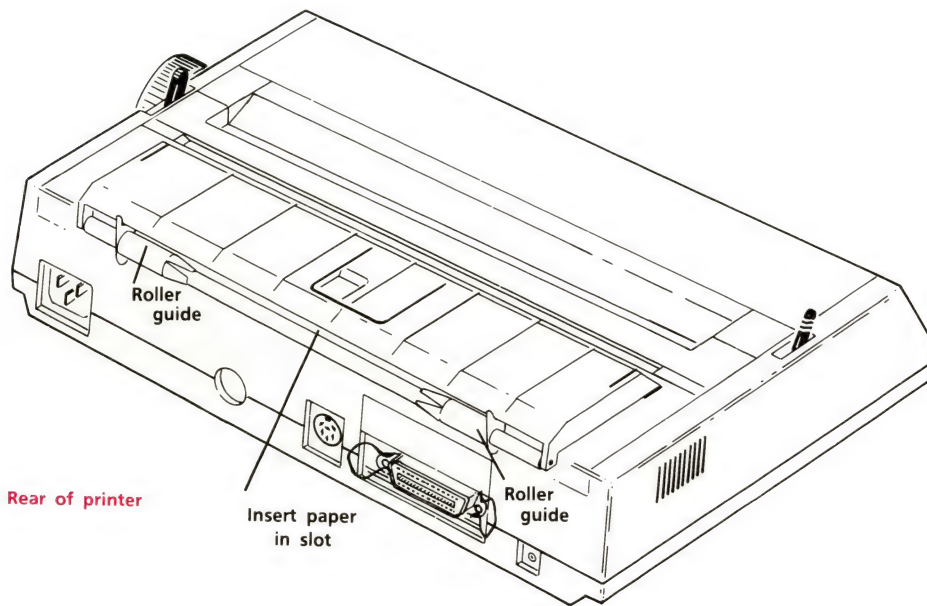
1. Raise the paper separator.
2. Open the bail lever.
3. Set the paper lever back to the single sheet setting.
4. Slide the paper behind the platen.



5. Use the platen knob to roll the paper in front of the platen and over the platen groove.
6. Close the bail lever.
7. The paper exits through the opening in the cover.

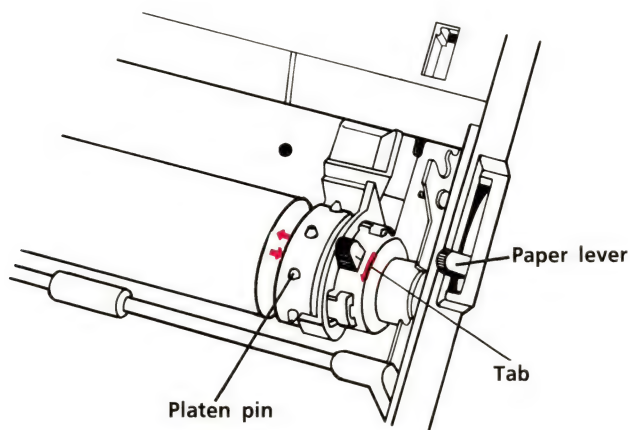
Continuous Forms (Rear Feed)

1. Remove the access cover.
2. Lay the paper separator flat on the printer.
3. Slide the roller guides to their widest position.
4. Insert the paper in the slot, sliding it behind the platen. Be sure the printhead gap lever is on the proper setting (see page 5).



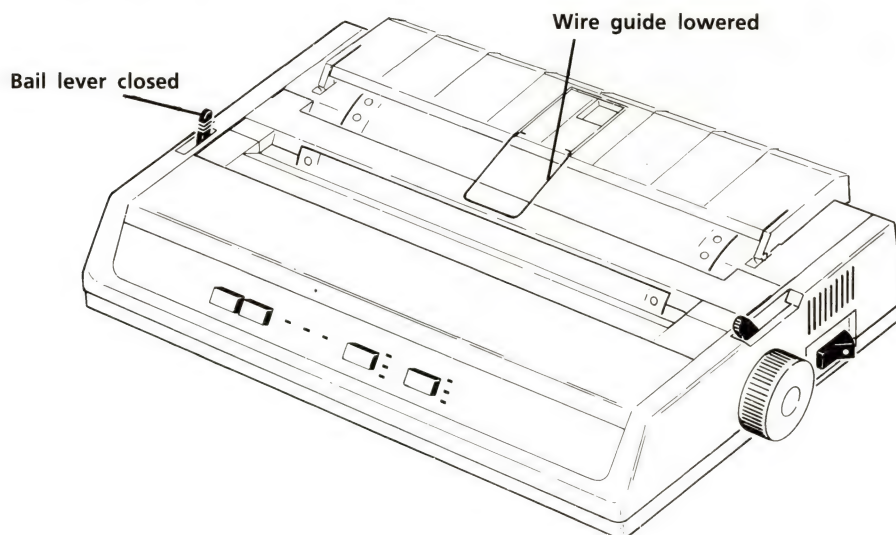
5. Adjust the roller guides so that the ends come as close as possible to the paper without actually touching it.
6. Open the bail lever.
7. Slide the paper lever forward to the continuous form setting.

8. Place the sprocket holes onto the platen pins—first the left side then the right. To adjust the pins, push the tabs forward and slide the pins to the right or left.



9. Using the platen knob, advance the paper to the front of the platen.

10. Close the bail lever.

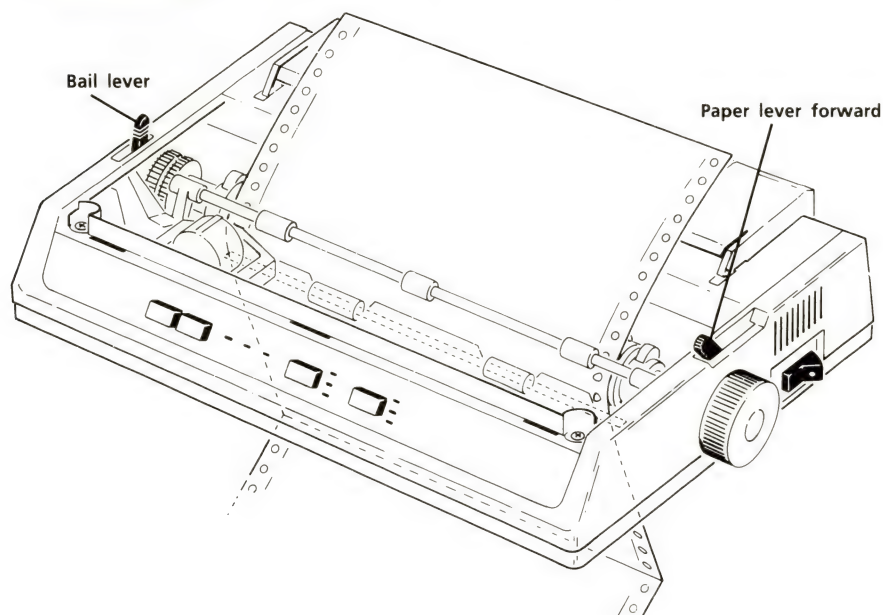


11. Replace the access cover so that the paper exits through the opening in the cover.
12. Lower the wire guide to prevent printed paper from reentering the printer.

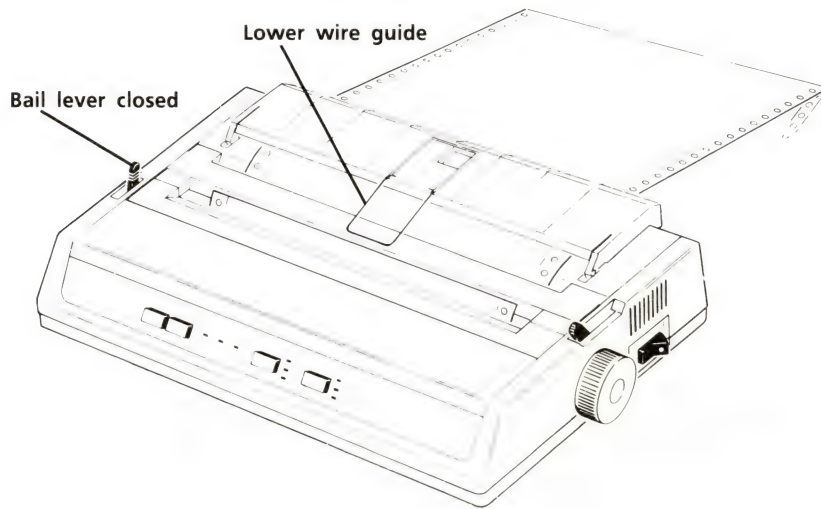
NOTE: Don't stretch the paper too tight. If the sprocket holes stretch or tear when paper is advanced, readjust the pins.

Continuous Forms (Bottom Feed)

1. Place the printer on a slotted printer stand.
2. Line the box of paper under the slot.
3. Open the bail lever.
4. Slide the paper lever forward to the continuous form setting.
5. Feed the paper up through the slot and in front of the platen. Be sure the printhead gap lever is on the proper setting (see page 5).



6. Place the sprocket holes onto the platen pins—first the left side then the right. To adjust the pins, push the tabs back and slide the pins to the right or left.
7. Close the bail lever.



8. Replace the access cover allowing the paper to exit through the opening.

NOTE: Don't stretch the paper too tight. If the sprocket holes stretch or tear when paper is advanced, readjust the pins.

Performing a Self Test

You can now check out the printer by running a self test:

1. With paper and ribbon loaded, press the FEED button while turning on the printer.

2. Release the FEED button and the printer will begin printing this pattern:

```

ODA180 EPS A F/W 02.00
! " # $ % & ' ( ) * + , - . / 0 1 2 3 4 5 6 7 8 9 : ; < = > ? @ A B C D E F G H I J K L M N O P Q R S T U V W X Y Z [ \ ] ^ _ ` a b c d e f g h i j k l m n o
! " # $ % & ' ( ) * + , - . / 0 1 2 3 4 5 6 7 8 9 : ; < = > ? @ A B C D E F G H I J K L M N O P Q R S T U V W X Y Z [ \ ] ^ _ ` a b c d e f g h i j k l m n o p
" # $ % & ' ( ) * + , - . / 0 1 2 3 4 5 6 7 8 9 : ; < = > ? @ A B C D E F G H I J K L M N O P Q R S T U V W X Y Z [ \ ] ^ _ ` a b c d e f g h i j k l m n o p q
# $ % & ' ( ) * + , - . / 0 1 2 3 4 5 6 7 8 9 : ; < = > ? @ A B C D E F G H I J K L M N O P Q R S T U V W X Y Z [ \ ] ^ _ ` a b c d e f g h i j k l m n o p q r
$ % & ' ( ) * + , - . / 0 1 2 3 4 5 6 7 8 9 : ; < = > ? @ A B C D E F G H I J K L M N O P Q R S T U V W X Y Z [ \ ] ^ _ ` a b c d e f g h i j k l m n o p q r s
% & ' ( ) * + , - . / 0 1 2 3 4 5 6 7 8 9 : ; < = > ? @ A B C D E F G H I J K L M N O P Q R S T U V W X Y Z [ \ ] ^ _ ` a b c d e f g h i j k l m n o p q r s t
& ' ( ) * + , - . / 0 1 2 3 4 5 6 7 8 9 : ; < = > ? @ A B C D E F G H I J K L M N O P Q R S T U V W X Y Z [ \ ] ^ _ ` a b c d e f g h i j k l m n o p q r s t u
' ( ) * + , - . / 0 1 2 3 4 5 6 7 8 9 : ; < = > ? @ A B C D E F G H I J K L M N O P Q R S T U V W X Y Z [ \ ] ^ _ ` a b c d e f g h i j k l m n o p q r s t u v
( ) * + , - . / 0 1 2 3 4 5 6 7 8 9 : ; < = > ? @ A B C D E F G H I J K L M N O P Q R S T U V W X Y Z [ \ ] ^ _ ` a b c d e f g h i j k l m n o p q r s t u v w
) * + , - . / 0 1 2 3 4 5 6 7 8 9 : ; < = > ? @ A B C D E F G H I J K L M N O P Q R S T U V W X Y Z [ \ ] ^ _ ` a b c d e f g h i j k l m n o p q r s t u v w x
* + , - . / 0 1 2 3 4 5 6 7 8 9 : ; < = > ? @ A B C D E F G H I J K L M N O P Q R S T U V W X Y Z [ \ ] ^ _ ` a b c d e f g h i j k l m n o p q r s t u v w x y
+ , - . / 0 1 2 3 4 5 6 7 8 9 : ; < = > ? @ A B C D E F G H I J K L M N O P Q R S T U V W X Y Z [ \ ] ^ _ ` a b c d e f g h i j k l m n o p q r s t u v w x y z
, - . / 0 1 2 3 4 5 6 7 8 9 : ; < = > ? @ A B C D E F G H I J K L M N O P Q R S T U V W X Y Z [ \ ] ^ _ ` a b c d e f g h i j k l m n o p q r s t u v w x y z {
- . / 0 1 2 3 4 5 6 7 8 9 : ; < = > ? @ A B C D E F G H I J K L M N O P Q R S T U V W X Y Z [ \ ] ^ _ ` a b c d e f g h i j k l m n o p q r s t u v w x y z { |
. / 0 1 2 3 4 5 6 7 8 9 : ; < = > ? @ A B C D E F G H I J K L M N O P Q R S T U V W X Y Z [ \ ] ^ _ ` a b c d e f g h i j k l m n o p q r s t u v w x y z { | }

```

NOTE: The first line of the self test contains information on the model and version of your printer, so this line of your printout may not look exactly like ours.

3. Stop the test by pressing the SELECT button or turning off the printer.

NOTE: When calling 1-800-OKIDATA for information or service, have a self test print sample available so that you can give the firmware information to our Customer Service Representative.

Connecting the Printer

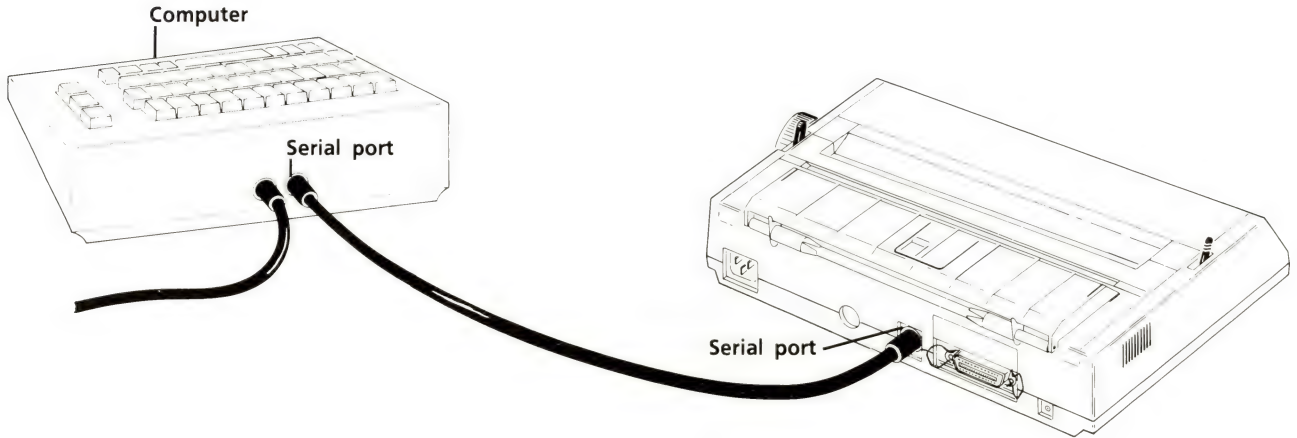
IMPORTANT: The printer's parallel and serial ports must not be connected simultaneously.

To a Commodore computer:

1. Make sure all the equipment is off.
2. Plug one end of the Commodore interface cable into the serial port

on the back of your printer. You shouldn't have to force it; the plug is designed to fit only one way.

3. Plug the other end of the cable into the serial port of the Commodore, lining up the notch on the cable with the notch on the serial port.



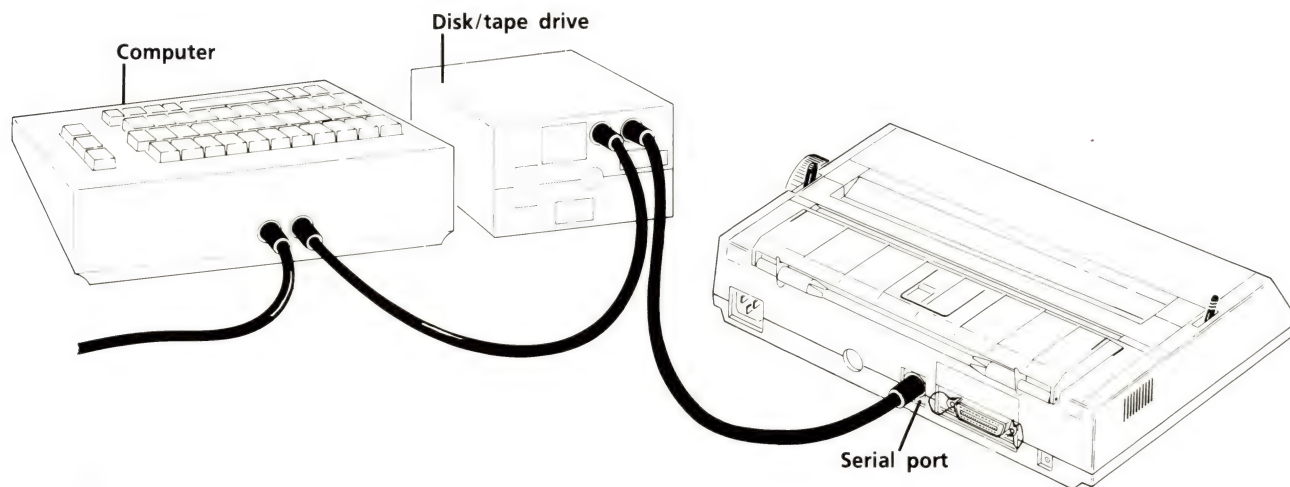
4. Refer to page 17 for information on setting the internal switches.

To a Commodore disk or tape drive:

NOTE: Your printer only has one interface port for the Commodore, so be sure it is the last item on your peripheral chain.

1. Make sure all the equipment is off.
2. Plug the Commodore interface cable into the port on the back of the peripheral (i.e., tape drive, disk drive or printer).

3. Make sure the peripheral's cable is connected to the serial port on the computer.

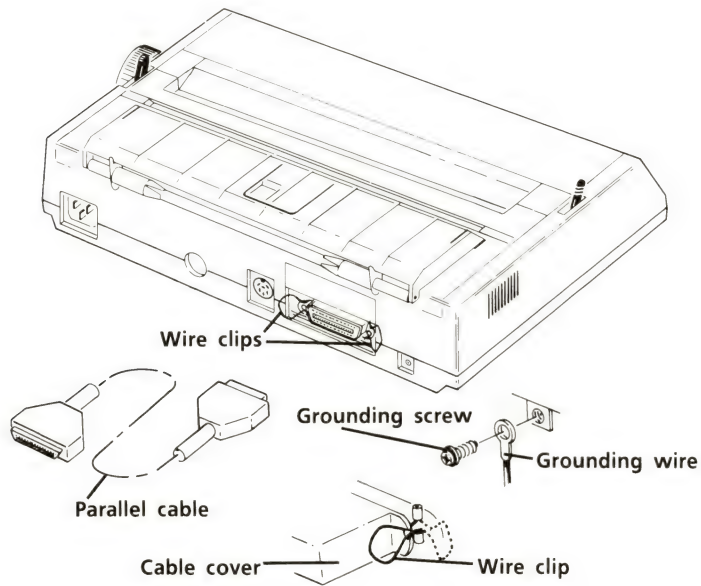


4. Refer to page 17 for information on setting the internal switches.

To an IBM PC® or compatible computer:

1. Make sure all the equipment is off.
2. Plug one end of the Centronics parallel interface cable into the parallel socket on the back of your printer. You shouldn't have to force it; the plug is designed to fit only one way.
3. Plug the other end of the cable into the parallel printer port of the computer.

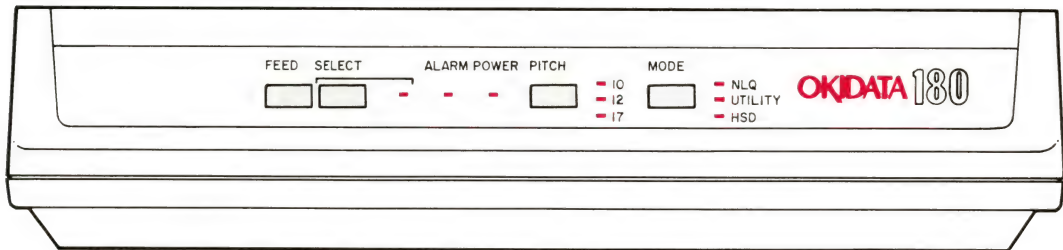
4. Bend the wire clips forward so that they lock on the cable cover.



5. Refer to page 17 for information on setting the internal switches.

Selecting Control Panel Features

In addition to the FEED and SELECT buttons, there are two buttons that allow you to choose one of three character pitches (10, 12 or 17 cpi) and one of three print quality modes (NLQ, Utility and HSD). There are also lights that indicate the current status of the printer. Here's an explanation of each of them:



SELECT:

Push to turn the SELECT light on or off. When the light is ON, the printer is selected and ready to print. When the light is OFF, the printer is deselected and not ready to print.

The SELECT lamp lights when the printer is ready to print. It flashes when the printer is in print suppress mode and not accepting data. (See page 63.)

To perform a hexadecimal dump, hold down the SELECT button while turning on the printer. All input data, including printer control codes, is converted to hexadecimal numbers until the printer is turned off.

Push the SELECT button to stop a self-test.

FEED:

When the printer is deselected, press and release to move the paper up one line. Press and hold to move the paper to the top of the next page.

ALARM:

Lights when the printer is out of paper, when there is a paper jam and when there is an error condition.

NOTE: With Commodore systems, an alarm will cause the computer to "freeze" because of the way all peripherals are connected through the same interface. If this happens, turn off all of the components of the system, correct the error condition, and turn the system on again.

POWER:

Lights when the printer is plugged in and turned on.

PITCH:

When the printer is deselected, press to choose 10, 12 or 17 characters per inch (cpi). The light to the left of the selection will go on when that pitch is in effect. See page 35 for details.

MODE:

When the printer is deselected, press to choose Near Letter Quality (NLQ), Utility or High Speed Draft (HSD). The light to the left of the selection will go on to indicate which print quality mode is in effect. See page 34 for details.

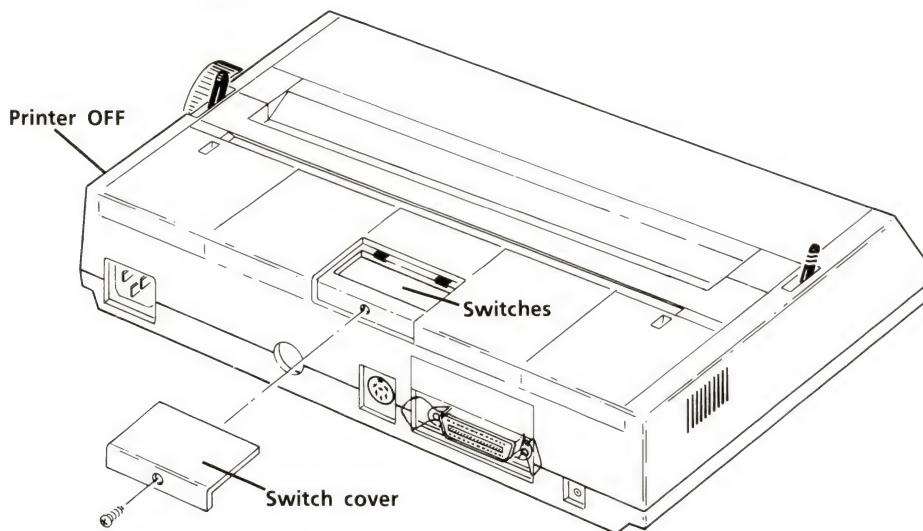
Chapter 2: Get Set

Setting the Internal Switches

To take advantage of the many fine features of your new printer, begin by selecting an emulation—either Commodore or Epson®—using switch 8 on the bank of internal switches. These switches also control selection of foreign-language character sets, form length and other features characteristic of the emulation you've chosen. Their factory settings are shown in red so that you don't have to touch these switches if they're already set the way you want them.

If you need to change any of the switches, follow these few steps:

1. Turn off the printer.
2. Remove the paper separator.



3. Remove the switch cover screw with a Phillips screwdriver.
4. Slide off the switch cover.

5. Using the tip of a pen, slide the switch to the proper setting.
6. Replace the cover and tighten the screw.
7. Replace the paper separator.

These features apply only if SW8 is set to OFF for Commodore emulation:

Commodore Emulation		
Character set	SW1	SW2
Commodore (0)	OFF	OFF
Commodore (0)	ON	OFF
French Canadian	OFF	ON
Spanish	ON	ON
Form length	SW3	SW4
5.5 inches	OFF	OFF
8.5 inches	ON	OFF
11 inches	OFF	ON
14 inches	ON	ON
Auto linefeed	SW5	
Auto linefeed on	ON	
Auto linefeed off	OFF	
Printer device #	SW6	
Device 4	ON	
Device 5	OFF	
Graphics density	SW7	
Normal	ON	
Double	OFF	
Emulation mode	SW8	
Epson	ON	
Commodore	OFF	

The following switch settings apply only if SW8 is ON for Epson emulation. Remember, since the factory settings were done based on the Commodore emulation, if you select Epson you're probably going to have to change the other switches as well. Shown in red are the switch settings from

the factory if only SW8 is changed. The asterisks indicate the settings you'll probably have to change to:

Epson Emulation			
Character set	SW1	SW2	SW3
USA	ON*	ON*	ON*
France	ON	ON	OFF
Germany	ON	OFF	ON
United Kingdom	ON	OFF	OFF
Denmark	OFF	ON	ON
Sweden	OFF	ON	OFF
French Canada	OFF	OFF	ON
Spain	OFF	OFF	OFF
Form length	SW4	SW5	
5.5 inches	OFF	OFF	
8.5 inches	ON	OFF	
11 inches	OFF*	ON*	
14 inches	ON	ON	
Auto linefeed	SW6		
Auto linefeed on	ON		
Auto linefeed off	OFF		
Zero	SW7		
With slash (Ø)	ON		
Without slash (0)	OFF		
Emulation mode	SW8		
Epson	ON*		
Commodore	OFF		

After you've chosen the switch settings you want, you're ready to begin printing. There are three ways you can change the features of your printer:

1. Using the control panel, you can change character size (10, 12 or 17 cpi) and print quality (NLQ, Utility or HSD) for an entire document.
2. With commercial software packages, you can produce all kinds of information—letters, home budgets, recipe files, even homework—and in most cases, you can change features within a document. We'll give you some general information on how the OKIDATA 180 works with software as well as a few pointers on getting the most out of the printer using your software.

3. If you do your own programming, you can easily add to a printout by using the Commodore or Epson control codes to select special features. We'll show you how to program the printer in both modes.

Using a Software Package

Most likely, you're planning to do your printing using a software package, like word processing or a spreadsheet program. Or maybe you're into recipe files, gardening programs or adventure games. Whatever the package, the first and most important step in obtaining a printed copy is to read the instructions that came with your software package.

NOTE: If you've selected Commodore emulation and see references in your Commodore software to TRUE ASCII and COMMODORE (or PET) ASCII, follow the instructions for COMMODORE (or PET) ASCII.

You'll find that some software programs couldn't be easier to use. For example, some of the Infocom text adventure games have you enter SCRIPT any time you want a printout and UNSCRIPT when you don't. So you don't have to make any choices. However, other packages require that you make a few choices. Usually these packages will have some kind of installation routine, which sets them up for the particular printer you're using. Generally, a menu is offered from which you select your printer. If you've selected the Commodore emulation, look for:

OKIDATA 180 Commodore
OKIDATA 120
COMMODORE MPS (such as 801, 802, 1525)
COMMODORE ASCII
OKIMATE 10 or 20
Commodore

If you've selected the Epson emulation, look for:

OKIDATA 180 Epson
Epson FX
Epson FX+
Epson MX
Epson RX

NOTE: Don't pick any other OKIDATA printer, like a MICROLINE® model; the codes are different and won't work properly with the OKIDATA 180.

Special codes control the printer's features, like changing character size, underlining and so on. How the computer sends these codes varies with the software package. Generally there are four ways codes are handled:

1. Separate files, called drivers, link the software's codes to the codes used by the printer. In many cases you can customize drivers for special purposes.
2. At the beginning of each document you insert a list that assigns printer codes to certain combinations of keystrokes used by the software.
3. A special keystroke combination allows you to put the printer codes directly into the file.
4. Some accounting and spreadsheet programs give you the option of adding codes when you give the print command. This lets you change printing styles for the entire document.

The charts in the appendices of this book give you a quick reference of all the printing features. For the Commodore emulation, see Appendix A and for Epson emulation, see Appendix B.

NOTE: Your software may be limited and may not allow you to use all the features available with your OKIDATA 180.

Printing with Popular Software Packages

We've taken the most popular software packages for IBM PCs and compatibles and for the Commodore 64 and 128 and presented an overview on how you change printing features using these packages. Since we can't present all the software packages on the market today, we selected packages that provide a broad range of ways to enter printing commands.

NOTE: Read your software manual before following these instructions.

Featured on the following pages are:

For Commodore computers (Commodore emulation)

PaperClip®
Easy Script®
WordPro 3 Plus®

For IBM PC® and compatibles (Epson emulation)

Lotus 1-2-3®, Release 2
WordPerfect® 4.1/4.2

NOTE: If you have a newer version of the software packages we've presented here, the OKIDATA 180 driver may be on the menu.

Commodore Packages (Commodore emulation)

Setting Up PaperClip

Here we'll show you how to use underlining with your PaperClip documents. Once you're acquainted with the procedure, you're welcome to incorporate any of the other features of your OKIDATA 180, like emphasized printing. To add new features, you don't have to repeat the entire setup procedure; just follow the editing instructions beginning on page 23.

NOTE: When you need to press a particular key, the instruction will be in brackets. For example, <INST/DEL> means press the delete key.

1. Insert the PaperClip cartridge pack into the Commodore control port 1 and turn on your computer. When READY appears, type: LOAD "PRINTER SETUP-D", 8 <RETURN>

If the response is "SETUP-D does not exist," type: LOAD "PRINTER SETUP-E",8 <RETURN>

2. Type: RUN <RETURN>. When "Load character set" appears, type: Y <RETURN>. You'll then be asked for a file name. Type: standard CBM <RETURN>

3. When "Load previous file" appears, type: Y <RETURN>. When asked for the file name, give this answer to set the printer up to emulate the Commodore VIC 1525 graphics printer. Type: 1525-p-alf <RETURN>
4. Next you'll be prompted for the ASCII value for "@" and you hold down the CONTROL key and type the number 0.
5. When "Carriage return" appears, press <CRSR DOWN> about six times until "Line begin characters" appears. Press <INST/DEL> to erase the Current entry and type: 17 <RETURN>
6. Now we're going to add the start underlining commands (27 67). Press <RETURN> three more times until "Secondary address" appears. Press <RETURN> again then press <CRSR DOWN>. When "Underline begin characters" appears, type: 27 <RETURN>. Press <INST/DEL> to erase the next entry and type: 67 <RETURN> in its place.
7. We're ready to add the stop underlining commands (27 68). Press <RETURN> three times until "Secondary address" appears. Press <RETURN> again then press <CRSR DOWN>. When "Underline end characters" appears, type: 27 <RETURN>. Press <INST/DEL> to erase the next entry and type: 68<RETURN> in its place.
8. Press <RETURN> three times until "Secondary address" appears, then press <RETURN> again.
9. Now press <CRSR DOWN> until "Secondary address for text" appears, then press <RETURN> and your printer file is established. Now this file must be saved by pressing <CTRL><SHFT>9 all at once. When "FILENAME" appears, type: OKIDATA 180 <RETURN>. When "Drive #" appears, enter 0 <RETURN>. Now reset your computer.

NOTE: If you have a Commodore 64, turn the computer off to reset it. Commodore 128 owners should press the reset button.

Editing a Document

To edit a document, you assign the file a name then enter the formatting features you want at the beginning of the document.

1. Begin editing by typing: LOAD "P*",8 <RETURN>

2. When "READY" appears, type: RUN <RETURN>
3. When the PaperClip opening screen appears, press and hold down <CTRL> and type: W
4. When "File name" appears, type: OKIDATA 180 <RETURN>, then press and hold down <CTRL> and type: L
5. This time when "File name" appears, give the name of the file you want to edit. Then the formatting features you want changed in the document are entered at the beginning of your document, like this:
For 12 cpi: Press <f>then type: pt12
To set the left margin to 12: Press <f>then type: lm12
To set the right margin to 80: Press <f>then type: rm80

Printing a Document

When you're ready to print a document, you'll be asked a series of questions about number of copies and type of paper being used—your answers may vary from document to document.

1. Press <CTRL> and type the letter O.
2. When "Continuous output" appears, type N or Y depending on whether you're printing on continuous form computer paper—answer Y for Yes. If you're printing on single sheets—answer N for No. Press <RETURN>.
3. When "Fill variable blocks" appears, type N for no. (Refer to the "Form Letters" section of your PaperClip manual for details.)
4. When "Number of copies" appears, type the number of copies you want printed.
5. When "Starting page" appears, type the page number where you want printing to begin.
6. When "Global" appears, type N if you want the current document to print or type Y if you want to print a different document. If you answer Y, you'll be prompted for the file name of the document you want to print.

7. To exit PaperClip, hold down <CTRL> and type: X

Setting Up Easy Script

NOTE: When you need to press a particular key, the instruction will be in brackets. For example, <F3> means press function key 3.

1. Insert the Easy Script disk into drive A and when "READY" appears, type: LOAD "0:*";8,1 <RETURN>
2. Now type: RUN <RETURN> and the prompt "Text Width" will appear. Enter the number of characters on a line followed by <RETURN>. When "Disk or Tape" appears, type: D for disk. When "Printer Type" appears, type the number 0 and you'll enter the edit mode.
3. Once in the edit mode you can assign 10 decimal codes to the numbers 0 through 9. Use combinations of the one-digit numbers when you need one of your printer's special features. The Commodore Control Codes chart in Appendix A gives the decimal codes for each of the ODA180's printing features. So, for example, if you wanted to use the reverse image feature, you would enter this:

Press <F3> then type: 0=18 (Turns on reverse print)

Press <F3> then type: 1=146 (Turns off reverse print)

For some features, you need to enter two decimal codes, like this command for subscripts:

Press <F3> then type: 2=27 (ESC character)

Press <F3> then type: 3=76 (Used with 27, turns on subscript)

Press <F3> then type: 4=77 (Used with 27, turns off subscript)

4. When you're ready to use these features in a document, press <F1> and type the number(s) you've assigned. So, using our example, to turn on subscripts, you enter:

Press <F1> then type: 2

Press <F1> then type: 3

Now to turn off subscripts, you enter:

Press <F1> then type: 2

Press <F1> then type: 4

NOTE: You can reassign the command values later in your document. Follow the steps outlined above for assigning values to decimal codes.

Printing a Document

To print a document, press <F1> then type O C P

Setting Up WordPro 3 Plus

NOTE: When you need to press a particular key, the instruction will be in brackets. For example, <RETURN> means press the return key.

1. Insert the WordPro disk, turn on the computer and when "READY" appears, type: LOAD "*",8 <RETURN>.
2. When "READY" appears again, type: RUN <RETURN>.
3. When the menu appears, go to the printer menu by typing: 8 <RETURN> then you'll be asked a few printer questions.
4. When "Number of lines" appears, enter: 329 <RETURN>.
5. When "Printer device" appears, enter: 4 <RETURN>.
6. When "Printer" appears, enter: A <RETURN>.
7. When "Disk drive" appears, enter: 8 <RETURN> and a status line will appear.

Entering Features

WordPro uses a decimal command string to enter printer features. You can choose features from the Commodore list in Appendix A. The next steps give examples of how features are entered. You aren't limited to these codes, use the decimal codes for whichever features you need in your document.

1. Press <CTRL> and type: / and a checkmark appears.

2. Enter up to seven decimal codes in a command string:

0=15:1=28:2=29:3=14:4=129:5=145:6=17

Here's what we entered:

0 = 10 cpi
1 = 12 cpi
2 = 17 cpi
3 = double width
4 = double width off
5 = cursor up
6 = cursor down

NOTE: To print in upper and lower case, the cursor down command must be entered at the beginning of your document.

3. When you want to insert one of the features in a document, press <CTRL> and type: ; followed by the number you've assigned to the feature you want. For example, in our list, 12 cpi is assigned to the number 1. To start printing in 12 cpi, we would press <CTRL> and then type: ;1
4. To change margin settings and justification, enter the following commands after the checkmark—press <CTRL> then type: /

lm = left margin
rm = right margin
ju = justified text

So to change the left margin to 12, the right margin to 80 and justify text, you would enter:

lm12
rm80
ju1

Printing a Document

Press <CTRL> then type: O C <RETURN>

IBM PC Packages (Epson emulation)

Setting Up WordPerfect 4.1 and 4.2

NOTE: When you need to press a particular key, the instruction will be in brackets. For example, <SHIFT F7> means press the SHIFT and the F7 key at the same time.

Be sure to have your WordPerfect printer disk(s) on hand. As each disk is needed, you'll be prompted to insert it.

1. To begin setting up the printer up with WordPerfect, you need to enter the Printer Control menu by pressing <SHIFT F7> and typing: 4
2. Select 3 from the menu and the printer definitions appear. The number of the current printer being defined is shown at the bottom left of your screen.
3. Use the arrow keys to select one of the six printers that hasn't been defined or that you want to redefine. Use printer 1 if the OKIDATA 180 is the only printer you're going to be using. WordPerfect uses printer 1 by default, unless you specify another printer number.
4. Press <PgDn> until Epson FX appears on the menu and type its definition number at the "Using Definition" prompt. Press <RETURN>.
5. When the submenu appears displaying the possible output ports, type the number corresponding to the printer port you're using—LPT1 is the common choice.
6. When the submenu appears for selecting type of forms, select Continuous if you're using perforated computer paper. To use single sheets of paper, select Hand Fed. After you've made your selections, the printer control menu will reappear.

NOTE TO 4.2 OWNERS: You can find out exactly what features are included in each printer definition by running the program PRHELP.EXE on printer disk 2. Enter PRHELP at the DOS prompt to start the program. If you want instructions, type: 1. If not, just use <PgDn> and the down arrow key to scroll through the list of printers. When you come to a printer definition that you want to see, type: 2.

Changing Features within a Document

You can use WordPerfect's standard commands for print features like bold, italic, and underline, as well as for formatting features, such as margins and page length. By pressing <CTRL F8>, you can also access features from the Print Format menu (font and pitch selection, line spacing, and underline style). If necessary, you can even enter printer codes directly in your document to control features of your OKIDATA 180 that are not supported by WordPerfect. For example, the WordPerfect Epson driver does not include support for foreign character sets. The procedure outlined below gives the command to select the German character set to replace certain keyboard characters.

1. To enter the print format menu, press <CTRL F8> then select A, "Insert Printer Command," from the menu.
2. Enter the command for the feature you want to change, using literal characters wherever possible and angle brackets around decimal values. To select the German character set, type: <27>R<2> and press <RETURN>.
3. When you're ready to exit the print format menu, press either- <RETURN> or <F7>.

NOTE: If you want to see or modify the codes you've entered into a document, press <ALT F3>. When the reveal codes screen is on, the back arrow deletes one character or command to the left of the cursor and the DEL key deletes one character or command to the right.

Printing a Document

To print a document, you can press <SHIFT F7> and a one line menu will appear at the bottom which lists the options you have. Choose "Full Text" if you want to print the entire document or "Page" if you just want to print one page. Another alternative for printing an entire document, is to press <F5>, select the file you want from the directory, then choose the print option from the one line menu.

Setting Up Lotus 1-2-3, Release 2

Follow the instructions in your Lotus 1-2-3 manual for using the INSTALL program to prepare 1-2-3 to communicate with your printer. If there is no OKIDATA 180 driver listed, select Epson FX-80.

1. From the ready mode, change the global printing defaults by typing:
/WGDP

Menu Title	Selection	Setting
Interface	1	For parallel interface
Page length	66 88	66 lines at 6 lpi or 88 lines at 8 lpi
Auto LF	N	Turn off auto linefeed
Setup	\027@	Resets printer
Quit	Q	Exit printer menu

NOTE: To make the installation permanent, type U before quitting the printer menu. If you don't make the installation permanent, your changes will only remain in effect for the current Lotus session.

2. To change printing styles, type: /PPO
3. When the printer options menu appears, type: S to revise the setup string.
4. You can add features to this string or replace it completely. For example, to print a spreadsheet in 12 cpi (27 "M"), enter \027M as the setup string.
5. To print a cell in 12 cpi, precede the string with ||. So the string would look like this: ||\027M

To return to 10 cpi, enter ||\027P at the point you want to change back.

NOTE: Be sure to have the cursor in the cell where you want the change to take effect.



Chapter 3: Go

Programming in Both Emulations

In addition to printing with commercial software, you can write your own programs for the OKIDATA 180, controlling all the features directly. In this section, we provide the codes for each feature in both decimal and ASCII to make it easy for you to enter codes into a program.

We also explain how to program your printer to change features with or without software. Remember, though, that commands to change features entered through programming or in software packages override previous control panel selections. If a command is given through your software that changes the print quality or character size, the selection will be shown on the control panel.

If you're programming in BASIC, you'll be using the CHR\$ statement. In BASIC, you can substitute decimal 33 through 126 with quotes around the literal ASCII characters. For example, if the printing feature you want is given as decimal 27 65, you could enter it as CHR\$(27);CHR\$(65) or CHR\$(27);"A".

NOTE: You may not be able to use quotes around literal characters with other programming languages and with some commands in BASIC. If a command doesn't work with quotes, substitute CHR\$(decimal value). Check your programming manual for details.

Commodore Emulation

To start printing with Commodore BASIC, you'll need these four statements:

OPEN 1,4,0

Opens the line of communication with a peripheral where 1 is the logical file (you can choose any number between 1 and 255), 4 is the device number (the device number for a printer

can be 4 or 5—your OKIDATA 180 is factory set as device 4) and 0 is the optional secondary address (gives a choice of printing modes; see page 37 for details). It doesn't matter what logical file number you assign to the printer, as long as you remember to use this number consistently in subsequent program statements.

PRINT#1,

Sends a line of data to the printer. Since we opened the printer as logical device 1, we continue to refer to it with the number 1 in the PRINT statement.

CLOSE 1

Closes the channel to the logical file that you opened with the OPEN statement. If you forget the CLOSE statement, you'll get a ?FILEOPEN error message when you try to OPEN a new file.

CMD 1

Makes your printer act like a monitor in that anything that would normally appear on your screen prints on the printer instead. Any PRINT or LIST command goes directly to the printer (without the need for mentioning a logical file). To stop the screen output, use a program line containing nothing but a PRINT#1, command followed by a program line with a CLOSE 1 statement.

Using Control Codes

If you use a PRINT statement followed only by text, your printer will print in the print quality and character size indicated on the control panel. By using control codes, you can spice up your copy, even change printing styles within a document, using headlines, underlines and other printing possibilities.

When you send the printer a control code, the printer responds by changing one of its printing features. The changes aren't permanent; they can be cancelled by sending certain other codes or by turning off the printer. When you write a program, insert the control code right before you want the special effect to take place. For more complex features, you'll be entering a combination of codes. The first code in most of these combinations is the ESCAPE code, which tells the printer to accept the next number as part of an instruction.

Characters in Commands

Commodore ASCII decimal code numbers 32 through 126 represent printable characters including letters, numbers and symbols. The chart in Appendix C shows these characters and symbols. Sending one of these codes to the printer in a PRINT statement prints the corresponding character.

This works in reverse, too. When an ASCII decimal code used in a command also represents a printable character, you can substitute the actual character for the decimal number as long as you place the character in quotes. Here's an example:

The decimal code for underlining is 27 67. If you check the Commodore ASCII chart in Appendix A, you'll see that decimal code 67 is also the letter C. To underline, use the statement `PRINT#1, CHR$(27);"C"` inserting the text that you want underlined between the C and the closing quotation mark:

```
PRINT#1, CHR$(27);"CThis text is underlined."
```

You'll notice that the letter C doesn't print; that's because the printer accepts the character following ESC as an instruction. Since many people find these ASCII characters easier to read and remember, we've used them as well as the decimal values of the commands throughout this programming section.

Commodore Control Codes

On the following pages we discuss how to program features that affect the appearance of printing, like underlining or character size. We also outline features that control the format of your printed page, like line spacing and page length. At the end of the section, we cover graphics and miscellaneous features.

NOTE: The ASCII column provided for each of the printing features is shown in cursor up mode.

Printing Style

The following commands let you change printing styles on your OKIDATA 180, including character size, underlining, superscripts and subscripts.

Print Quality	Decimal	Commodore ASCII
Utility	27 48	ESC 0
Near letter quality	27 49	ESC 1
High speed draft	27 40 48	ESC (0

You choose one of these three types of character fonts depending on the type of document you're printing. Near letter quality (NLQ) printing is the crispest of the three, created with two passes of the printhead. It's used for finished documents, correspondence and the like. But because of the dual pass operation, it offers the slowest printing speed.

Utility printing is for drafts and informal documents that you need in a hurry or are still editing and rewriting. You can change character size and various features in this mode, so that you can get a good idea of what the final document will look like when it's printed in NLQ.

High speed draft offers the advantages of just what the name implies—high speed. This mode is excellent for quick turnaround documents and drafts where appearance isn't vital. The limitation of this mode is that you can't change printing features, such as bold and emphasized.

Character Size	Decimal	Commodore ASCII
10 cpi	15	SI
12 cpi	28	FS
17 cpi	29	GS

Pica, 10 cpi, is normal typewriter size characters. To change to elite, 12 cpi, send the PRINT#1, CHR\$(28) command. To change to condensed, 17 cpi, use CHR\$(29) and to return to pica, use CHR\$(15) in the command. These changes are also reflected on the front panel.

NOTE: 17 cpi will not print in NLQ.

Double Wide Characters	Decimal	Commodore ASCII
5 cpi	15 14	SI SO
6 cpi	28 14	FS SO
8.5 cpi	29 14	GS SO
Stop double width	129	

For a headline effect, you can double the width of your characters, turning 10 cpi into 5 cpi, 12 cpi into 6 cpi and 17 cpi into 8.5 cpi. Double width stays in effect for one line only.

Since the SO command actually doubles the width of the character size you're currently using, it isn't necessary for you to enter both commands as shown above unless you want to change the size you're doubling. For example, if you're using 10 cpi and you want to switch to 5 cpi, you only need to insert the CHR\$(14) command into your program.

After one line, the printer will return to the character width (10, 12 or 17 cpi) that was in effect before the double wide command was sent.

NOTE: 8.5 cpi will not print in NLQ.

Underlining

	Decimal	Commodore ASCII
Start underlining	27 67	ESC C
Stop underlining	27 68	ESC D

To underline a word or phrase, use the `CHR$(27);"C"` command. Underlining won't work with reverse printing or graphics. To stop underlining, give the `CHR$(27);"D"` command.

Superscripts/Subscripts

	Decimal	Commodore ASCII
Start superscript	27 74	ESC J
Stop superscript	27 75	ESC K
Start subscript	27 76	ESC L
Stop subscript	27 77	ESC M

Subscripts and superscripts are small block-style characters (half-height, full width) used for printing above or below the print line for footnote references, formulas, equations and trademarks. Subscript characters print slightly below the print line. To program a subscript character, use the `CHR$(27);"L"` command before you type the character(s) you want printed as a subscript. To return to the normal print line, use the `CHR$(27);"M"` command. The following BASIC statement prints the formula for water:

```
PRINT#1, "H";CHR$(27);"L2";CHR$(27);"MO"
```

Likewise, a superscript character prints slightly higher than normal characters. To program a superscript use the `CHR$(27);"J"` command before you type the character(s) you want printed as a superscript. Then, when you're ready to return to the normal print line, send the `CHR$(27);"K"` command. This BASIC statement prints "OKIDATA 180™":

```
PRINT#1, "OKIDATA 180";CHR$(27);"JTM";CHR$(27);"K"
```

NOTE: A superscript command will cancel a subscript command and vice versa.

Enhanced/Emphasized	Decimal	Commodore ASCII
Start enhanced	27 72	ESC H
Stop enhanced	27 84	ESC T
Start emphasized	27 73	ESC I
Stop emphasized	27 84	ESC T

Emphasized and enhanced printing provide a bolder look that's useful when you want to call attention to a word or phrase. Each character is printed by slightly offsetting the dots that make up the characters—horizontally in the case of emphasized, and vertically in the case of enhanced printing. You can also combine both printing styles to give your characters an extra bold appearance. Both emphasized and enhanced printing are stopped when `CHR$(27);"T"` is sent.

NOTE: Emphasized printing is limited to 10, 12, and 17 cpi utility mode. Enhanced printing is only available in utility mode. Superscripts, subscripts, Commodore graphics characters, high speed draft, NLQ and reverse printing cannot be done in either emphasized or enhanced.

Cursor Up/Cursor Down	Decimal	Commodore ASCII
Cursor up	145	CURSOR UP
Cursor down	17	CURSOR DOWN (DC1)

Commodore computers offer a choice of using cursor up or cursor down characters for printing. Cursor up characters are uppercase letters and graphic symbols. If you want the printer to print using these characters, use a `PRINT#1, CHR$(145)` statement in your program.

The cursor down characters are both upper- and lowercase letters. To use them, send a `CHR$(17)` to the printer in the same `PRINT` statement as the data to be printed. If the cursor down command is on a separate program line from the data, it will not take effect. For more details on both modes, see your computer manual.

To select cursor up or cursor down modes for more than a single line, specify a secondary address in an `OPEN` statement, as shown below:

Cursor up mode	<code>OPEN 1,4,0</code>
Cursor down mode	<code>OPEN 1,4,7</code>

Once again, we have assigned 1 as the logical file number and 4 as the device number. The third number in the open statement selects print modes: 0 for cursor up mode and 7 for cursor down mode.

NOTE: The secondary address is optional; if you don't include it, the printer will be in the cursor up mode.

Character Sets	Decimal	Commodore ASCII
Slashed zero	27 33 64	ESC ! @
Unslashed zero	27 33 65	ESC ! A
French Canadian	27 33 66	ESC ! B
Spanish	27 33 67	ESC ! C

The slashed zero character set gives you the standard Commodore characters with the zeros printed with a slash through them. Slashed zeros are useful in applications like accounting, where it's important to distinguish between zero and the letter O. Naturally, if you don't want the slash through the zero, select the unslashed zero character set.

When you use the command for either the French Canadian or Spanish character sets, you print symbols and characters unique to these languages. You'll see the standard characters on the screen but the printer will print the proper language character as shown on the chart below. For example, the following BASIC statement will print j instead of the @ symbol:

```
PRINT#1, CHR$(27);"!";CHR$(67);"@"
```

Commodore Character Sets

CODE	LANGUAGE SET	35	38	48	64	79	91	92	93	94	95	96	123	124	125	126
ESC!j	SLASHED ZERO	#	&	Ø	Ø	Ø	[	£	]	↑	←	--	+	⌘	|	π
ESC!A	NON-SLASH ZERO	#	&	Ø	Ø	Ø	[	£	]	↑	←	--	+	⌘	|	π
ESC!B	FRENCH CANADIAN	ù	è	ø	à	ø	à	ç	é	í	ï	ô	é	ù	è	ú
ESC!C	SPANISH	!	&	Ø	!	Ø	ñ	ñ	¿	ú	←	á	é	í	ó	ú

Reverse Print

Decimal

Commodore ASCII

Start reverse print

18

RVS ON

Stop reverse print

146

RVS OFF

You can create white letters on a black background using the reverse print command. It stays in effect for one line only so if you want a series of reverse print lines, you will have to send CHR\$(18) at the beginning of each line. This feature is available only with 10 cpi and 5 cpi and utility printing.

NOTE: We do not recommend printing more than five consecutive lines of reverse print. Heavy use of reverse printing can damage the printhead.

Controlling Forms

The following commands let you change the length, width and format of a printed page.

Carriage Return	Decimal	Commodore ASCII
CR with LF	13	CR
CR without LF	141	CR w/o LF

A carriage return (CR) with a line feed (LF) causes the printer to print one line of data then advance the paper one line. A carriage return without a line feed prints a line of data without causing the paper to advance.

NOTE: Internal switch 5 must be ON for the CR with LF command to work. (See page 18.)

Line Spacing	Decimal	Commodore ASCII
Line feed	10	LF
Set 6 lines per inch	27 54	ESC 6
Set 8 lines per inch	27 56	ESC 8
Line feed (n/144")	27 10 n	ESC LF n
Set n/144" line spacing	27 86 n	ESC V n

NOTE: n = a number between 0 and 255. When n equals 0, the line spacing or line feed is 256/144.

Sending a line feed command makes the printer advance the paper one line. The standard line spacing is 6 lines per inch (lpi). You can reset the line spacing to 8 lpi by sending the CHR\$(27);"8" command or to a multiple of n/144" by using CHR\$(27);"V";CHR\$(n). If you just want to execute a single n/144" line feed without changing line spacing, send the CHR\$(27);CHR\$(10);CHR\$(n) command. For example, if you wanted to perform a 1/2" (72/144") line feed, you would use the following BASIC statement:

```
PRINT#1, CHR$(27);CHR$(10);CHR$(72)
```

NOTE: Line spacing in graphics is fixed to 14/144". The above commands are therefore invalid in graphics mode.

Form Length	Decimal	Commodore ASCII
Form feed	12	FF
Form length	27 70 nn	ESC F nn

NOTE: nn represents a two-digit number between 01 and 99 that indicates the number of lines per page.

When you send a form feed command, the printer advances to the top of the next page. The length of the form is determined by the setting of internal switches 3 and 4 which are factory set to 11". (See page 18 for more details.)

You can also program the form length with the `CHR$(27);"F";CHR$(nn)` command where nn can be any two-digit number from 01 to 99. Send the value of nn as a string of two digits: "12". If you wanted to set a form length of nine lines, you would use the BASIC statement:

```
PRINT#1, CHR$(27);"F";"09"
```

Form length is reset to the switch settings when the printer is turned off, when the CAN code is sent and when the secondary address of 10 is given in an OPEN statement.

Skip Over Perforation	Decimal	Commodore ASCII
Start auto skip	27 65	ESC A
Stop auto skip	27 66	ESC B

The skip over perforation or, auto skip, command causes the printer to automatically advance to the top of the next page when there's only an inch remaining at the bottom of a page. If your form length is set for less than an inch, this command is ignored. Since most software packages send their own auto skip command, this feature is turned off unless you send the command to set it.

Paper-Out Sensor	Decimal	Commodore ASCII
Sensor off	27 69 49	ESC E 1
Sensor on	27 69 48	ESC E 0

There's a sensor in your printer that detects when paper is low so that whenever the printer comes within one inch of the bottom of the last sheet, printing stops and the alarm light goes on.

The `CHR$(27);"E1"` command disables both the rear and bottom feed sensors, which causes the printer to continue printing until the next top of form is reached. This can be done for documents that extend beyond the one inch bottom margin. The alarm light will come on when paper is out regardless of whether the sensors are activated or deactivated.

The paper-out sensor is reactivated when you send the `CHR$(27);"E0"` command to the printer.

NOTE: If the sensor is off, be careful not to print on the platen, which can damage the printhead.

Left Margin	Decimal	Commodore ASCII
Set by character column	16 nn	POS nn
Set by dot column	27 16 n1 n2	ESC POS n1 n2

NOTE: nn = a two-digit number indicating the starting character column.
n1 = quotient of number of columns divided by 256
n2 = remainder of number of columns divided by 256

This feature lets you start printing at a specific distance from the left side of a page. You can program this distance in character columns or, for a more exact placement, in dot columns.

If you want to set the distance by character columns, use the `CHR$(16);nn` command where nn is a two digit number that represents the number of columns from the left side of a page where you want printing to start. So if you wanted to print 10 columns in from the left, give the statement:

```
PRINT#1, CHR$(16);"10"
```

NOTE: At 10 cpi, the value of nn can't be greater than 79. At 12 cpi, nn can't be greater than 95. At 17 cpi, nn can't be greater than 135.

If you're using 17 cpi and you want the value of nn to be greater than 99, use the codes given in the chart below. So if the value of nn is 134, you would use the statement:

```
PRINT#1, CHR$(16);"=4"
```

Decimal Values for Columns 100 to 135 (Condensed printing)			
100 = 58 48	110 = 59 48	120 = 60 48	130 = 61 48
101 = 58 49	111 = 59 49	121 = 60 49	131 = 61 49
102 = 58 50	112 = 59 50	122 = 60 50	132 = 61 50
103 = 58 51	113 = 59 51	123 = 60 51	133 = 61 51
104 = 58 52	114 = 59 52	124 = 60 52	134 = 61 52
105 = 58 53	115 = 59 53	125 = 60 53	135 = 61 53
106 = 58 54	116 = 59 54	126 = 60 54	
107 = 58 55	117 = 59 55	127 = 60 55	
108 = 58 56	118 = 59 56	128 = 60 56	
109 = 58 57	119 = 59 57	129 = 60 57	

For a more exact placement, you can set a left margin in dot columns using the CHR\$(27);CHR\$(16);CHR\$(n1);CHR\$(n2) command. This command lets you specify the exact dot column to begin printing, especially useful for graphics. To find the value of n1, you take the dot column where printing is to start and divide it by 256. The quotient after you've divided is n1 and the remainder is n2.

For example, suppose you want a three inch left margin, with the printer set for 10 cpi. Look at the dot column table below; at 10 cpi, there are 60 dot columns per inch, so printing would begin 180 dot columns in from the left edge of the paper. Take 180 and divide it by 256:

$$\begin{array}{r}
 0 = n2 \\
 256 \overline{)180} \\
 \underline{0} \\
 180 = n1
 \end{array}$$

Then the statement would be:

```
PRINT#1, CHR$(27);CHR$(16);CHR$(0);CHR$(180)
```

Dot Columns per Inch

Pitch	Dots per Inch	Maximum Left Margin
10 cpi	60	479
12 cpi	72	575
17 cpi	103	821

Reset Printer

Decimal

Commodore ASCII

Cancel

24

CAN

The cancel command resets the printer to the default settings shown below but has no effect on top of form, form length or paper end detect.

Default Settings	
Character size	10 cpi
Line spacing	6 lpi
Auto skip	Off
Character set	Cursor up
Print quality	Utility

You can also use the secondary address command to reset the printer to its default state (shown above). Specify a secondary address of 10 in an OPEN statement. Be sure to use the logical file and device numbers that you originally used. In our example, we are addressing logical file 1 and device 4:

```
OPEN 1,4,10
```

Printing Graphics

The OKIDATA 180's graphics capabilities let you print charts, graphs and pictures just like a newspaper photograph, using thousands of tiny dots. That's right, thousands. So that if that number intimidates you, we recommend that you purchase a software program that makes graphics a whole lot simpler. However, if you're up for the challenge, here's what you'll need to know to program a graphic image yourself.

Graphics

Decimal

Commodore ASCII

Start graphics

8

BS

Normal density

27 80

ESC P

High density

27 81

ESC Q

In graphics, each ASCII code represents a single column pattern, seven dots high. To program an image, you first map it as a series of dot columns. We'll use a square as an example.

Each of the rows has an assigned value as shown. To program a pattern, you must first calculate the total value of each column by adding the value of each row where a dot appears. Then you add 128 to each column total. Here's how our square adds up:

64	○	○	○	○	○	○	○	○
32	○							○
16	○							○
8	○							○
4	○							○
2	○							○
1	○	○	○	○	○	○	○	○
	127	65	65	65	65	65	65	127
	+ 128	128	128	128	128	128	128	128
	255	193	193	193	193	193	193	255

Writing the Program

You can print your image in either normal or double density. In normal density, each row of dots has a horizontal resolution of 60 dots per inch (dpi) and a vertical resolution of 72 dpi. In double density, the vertical resolution remains at 72 dpi but the horizontal resolution increases to 120 dpi, giving the double density image a darker, denser look.

When you write your program, you first send a density command, either `CHR$(27);"P"` for normal density or `CHR$(27);"Q"` for double density. Once the printer receives either of these commands, the codes that follow are printed as graphics. It is at this point that you give the values you calculated for your graphic image.

NOTE: For complex patterns that take more than one line of BASIC to program, each line must end with a semicolon.

Keep in mind when you're in graphics mode that any of the following commands will put you back into text mode:

Decimal	Commodore ASCII	Code
15	SI	10 cpi
28	FS	12 cpi
29	GS	17 cpi

Here's our square written as a program:

```
10 OPEN 1,4 : REM Open device 4 as logical file 1
20 PRINT#1, CHR$(27);"Q";CHR$(8); :REM Enter double density graphics mode
30 FOR I=1 TO 8 : REM There are 8 columns in the square
40 READ A : REM Read a column of data
50 PRINT#1, CHR$(A); : REM Print the column
60 NEXT I
70 PRINT#1, CHR$(15) : REM Return to 10 cpi text mode
80 CLOSE 1 : REM Close logical file 1
90 END
100 DATA 255, 193, 193, 193, 193, 193, 193, 255
```

And here's what prints:



If you want to set a left margin for your graphics design, the command `CHR$(27);CHR$(16);CHR$(n1);CHR$(n2)` lets you specify the exact dot column to begin printing. (See page 42 for details.)

Repeating Graphics

Decimal

Commodore ASCII

Repeat graphics n times

26 n

SUB n

NOTE: n = a number between 0 and 255. If n is 0, the pattern is repeated 256 times.

The repeat graphics command allows you to repeat a dot column across a page for creating borders or charts. To repeat a column, use the `CHR$(26);CHR$(n)` command where n represents the number of times to repeat the image (from 1 to 256).

Epson Emulation

Using Control Codes

If you use a BASIC LPRINT statement followed only by text, your printer will select the print mode and character size indicated on the control panel. By using control codes, you can spice up your copy, even change printing styles within a document, using headlines, underlines and other printing possibilities.

NOTE: Commands to change features entered through programming or in software packages override previous control panel selections. If a command is given through your software that changes the print quality or character size, the selection will be shown on the control panel.

When you send the printer a control code, the printer responds by changing one of its printing features. The changes aren't permanent; they can be cancelled by sending certain other codes or by turning off the printer.

When you write a program, insert the control code right before you want the special effect to take place. For some features, you'll be entering a combination of codes beginning with the ESCAPE code, decimal 27, which tells the printer to accept the next character as part of an instruction.

Characters in Commands

ASCII decimal code numbers 32 through 126 represent printable characters including letters, numbers and symbols. The chart in Appendix D shows these characters and symbols. Sending one of these codes to the printer in an LPRINT statement prints the corresponding character.

This works in reverse, too. When an ASCII decimal code used in a command also represents a printable character, you can substitute the actual character for the decimal number as long as you place the character in quotes. Here's an example:

The code for 12 cpi is 27 77. If you check the ASCII chart in Appendix D, you'll see the decimal code 77 is also the letter M. To select 12 cpi you could use this statement:

```
LPRINT CHR$(27);"M"
```

You'll notice that the letter M doesn't print; that's because the printer accepts the character following ESC as an instruction. Since many people find these characters easier to read and remember, we've used them often throughout this programming section.

NOTE: You may not be able to use quotes around literal characters with other programming languages and with some commands in BASIC. If a command doesn't work with quotes, substitute CHR\$(decimal value).

Epson Programming Features

On the following pages we discuss how to program features that affect the appearance of printing, like underlining or character size. We also outline features that control the format of your printed page, like line spacing and page length. At the end of the section, we cover graphics and miscellaneous features.

Printing Style

The following commands let you change printing styles on your OKIDATA 180, including character size, underlining, superscripts and subscripts.

Print Quality	Decimal	ASCII
Near letter quality	27 120 1	ESC x 1
Utility	27 120 0	ESC x 0
High speed draft	27 40 48	ESC (0

You choose one of these three types of character fonts depending on the type of document you're printing. Near letter quality (NLQ) printing is the crispest of the three, created with two passes of the printhead. It is used for finished documents, correspondence and the like. But because of the dual pass operation, it offers the slowest printing speed.

Utility printing is for drafts and informal documents that you need in a hurry or are still editing and rewriting. You can change character size and various features in this mode, so that you can get a good idea of what the final document will look like when it's printed in NLQ.

High speed draft offers the advantages of just what the name implies—high speed. This mode is excellent for quick turnaround documents and drafts where appearance isn't vital. The limitation of this mode is that you can't change printing features such as emphasized and italics.

Character Size	Decimal	ASCII
10 cpi	27 80	ESC P
12 cpi	27 77	ESC M
Condensed	15 or 27 15	SI or ESC SI
Cancel condensed	18	DC2

Pica, 10 characters per inch (cpi), is normal typewriter size characters. To change to elite, 12 cpi, send the CHR\$(27);“M” command. Condensed printing is either 17 or 20 cpi, depending on whether you're in 10 cpi or 12 cpi when it's requested. If you're in 10 cpi and send either condensed command, you'll switch to 17 cpi. If you're in 12 cpi and send either condensed command, you'll switch to 20 cpi. To return to the original character size, either 10 cpi or 12 cpi, send the cancel condensed code, CHR\$(18). Keep in mind when you change character size, you may also need to change your right margin (see page 59). Below are the standard margin settings using one inch margins for each character size.

Character Size	Left Margin	Right Margin
10 cpi	10	70
12 cpi	12	84
17 cpi	17	125
20 cpi	20	140

Changes in the character size are reflected on the front panel. The commands for 10, 12, 17 and 20 cpi do not cancel double width.

Double Wide Characters

	Decimal	ASCII
Start double width	27 87 1	ESC W 1
Stop double width	27 87 0	ESC W 0
Double width (1 line)	14	SO
Stop 1 line double width	20	DC4

For a headline effect, you can double the width of your characters by sending the command `CHR$(27);"W";CHR$(1)`. This command doubles the width of the character size you're currently using, turning 10 cpi into 5 cpi, 12 cpi into 6 cpi, 17 cpi into 8.5 cpi and 20 cpi into 10 cpi.

If you only want double width for one line or for a few characters on a line, it's probably easier to send the `CHR$(14)` command. When you're ready to return to normal printing, send the `CHR$(20)` command or wait until the end of the line when printing will automatically return to the standard size.

NOTE: Not available in high speed draft.

Underlining

	Decimal	ASCII
Start underlining	27 45 1	ESC - 1
Stop underlining	27 45 0	ESC - 0

To underline a word or phrase, use the `CHR$(27);"-";CHR$(1)` command. To stop underlining, give the `CHR$(27);"-";CHR$(0)` command. The printer will not underline the spaces provided by horizontal tabs although individual space characters will be underlined.

Enhanced/Emphasized	Decimal	ASCII
Start emphasized	27 69	ESC E
Stop emphasized	27 70	ESC F
Start enhanced	27 71	ESC G
Stop enhanced	27 72	ESC H

Emphasized and enhanced printing provide a bolder look that's useful when you want to call attention to a word or phrase. Each character is printed twice, with the second pass being printed slightly offset from the first—horizontally in the case of emphasized, and vertically in the case of enhanced printing. You can also combine both printing styles to give your characters an extra bold appearance.

Emphasized printing is cancelled by the CHR\$(27);"F" command, and enhanced printing is cancelled when the CHR\$(27);"H" command is sent.

NOTE: Superscripts, subscripts, NLQ and high speed draft characters are not available in either emphasized or enhanced print. In addition, emphasized printing is not compatible with italics.

Italics	Decimal	ASCII
Select italics	27 52	ESC 4
Cancel italics	27 53	ESC 5

Available in 10 cpi and 12 cpi, the unique slanted appearance of italic characters can add emphasis to a word or phrase, even to an entire document. Italic characters are selected with the CHR\$(27);"4" command. Printing returns to the normal character set when the CHR\$(27);"5" command is sent.

Because both emphasized and italic characters use a horizontal offset to achieve their special effect, they can't be combined. When you want italic characters to look bold, use enhanced printing.

Composite Print

Print mode select

Decimal

27 33 n

ASCII

ESC ! n

NOTE: See chart and explanation for the values of n.

The composite command gives you the convenience of selecting a combination of features with one command. The features available are assigned a value. Take the value for each feature you want and add them together. The total is the value of n.

For example, if you wanted to print in 12 cpi (with a value of 1) and italics (64), you would use the BASIC statement:

```
LPRINT CHR$(27);"!";CHR$(65).
```

Print Mode	Value
Underline	128
Italics	64
Double width	32
Enhanced	16
Emphasized	8
Condensed	4
12 cpi	1
10 cpi	0

Each time you send this command, it sets or cancels all of the eight features it controls. This means that if you want to add underlining to the 12 cpi italics set in our example, you have to add 128 (the value for underlining) to 65, and send the command as CHR\$(27);"!";CHR\$(193). Just sending CHR\$(27);"!";CHR\$(128) would turn off the other features as it turned underlining on.

Superscripts/Subscripts

	Decimal	ASCII
Start subscript	27 83 1	ESC S 1
Start superscript	27 83 0	ESC S 0
Stop sub-/superscript	27 84	ESC T

Subscripts and superscripts are half-size, block-style characters used for printing special symbols above or below the print line for footnote references, formulas, equations and trademarks. Subscript characters print slightly below the print line. To program a subscript character, use the CHR\$(27);"S";CHR\$(1) command before you type the character(s) you want printed as a subscript. To return to the normal print line, use the CHR\$(27);"T" command. The following BASIC statement prints the formula for water:

```
LPRINT "H";CHR$(27);"S12";CHR$(27);"TO"
```

Likewise, a superscript character prints slightly higher than normal characters. To program a superscript character, use the CHR\$(27);"S";CHR\$(0) command before you type the character(s) you want printed as a superscript. Then, when you're ready to return to the normal print line, send the CHR\$(27);"T" command. This BASIC statement prints "OKIDATA 180TM".

```
LPRINT "OKIDATA 180";CHR$(27);"S0TM";CHR$(27);"T"
```

International Character Sets

	Decimal	ASCII
Select character set	27 82 n	ESC R n

NOTE: Refer to the following table for the possible values of n:

Country	Value of n
U.S. ASCII	0
France	1
Germany	2
United Kingdom	3
Denmark	4
Sweden	5
Spain	7
French Canada	11

When you use the command for any of these character sets, you print special symbols and characters used in these languages. You'll see the standard characters on the screen but the printer will print the proper language character as shown on the chart below. For example, if you enter the Spanish character set using the CHR\$(27);"R";CHR\$(7) command, and then type the @ symbol, the printer will print the Spanish ¡ symbol.

Epson International Character Sets

	CODE	35	36	37	64	79	91	92	93	94	95	96	123	124	125	126
n	LANGUAGE															
0	USA	#	\$	&	@	O	[	\	\]	^	_	`	(	|	)	~
1	FRANCE	£	§	&	à	ó	°	ç	§	^	_	`	é	ù	è	é
2	GERMANY	#	\$	&	§	ó	×	ö	ü	^	_	`	ß	ö	ü	ß
3	UK	£	§	&	@	O	[	\	\]	^	_	`	(	|	)	~
4	DENMARK	#	\$	&	@	O	Æ	Ø	Å	U	_	`	æ	ø	å	U
5	SWEDEN	§	¤	&	é	ó	×	ö	Å	^	_	`	é	ä	ö	å
6	USA	#	\$	&	@	O	[	\	\]	^	_	`	(	|	)	~
7	SPAIN	!	§	&	|	ó	ñ	ñ	¿	ü	_	`	á	é	í	ó
8	USA	#	\$	&	@	O	[	\	\]	^	_	`	(	|	)	~
9	USA	#	\$	&	@	O	[	\	\]	^	_	`	(	|	)	~
10	USA	#	\$	&	@	O	[	\	\]	^	_	`	(	|	)	~
11	FRENCH CANADA	ü	§	é	à	ø	à	ç	é	í	ý	ö	é	ù	è	à

Printhead and Carriage Movement

The following commands let you control direction, speed and action of the printhead and carriage.

Carriage Return	Decimal	ASCII
Carriage return	13	CR

A carriage return (CR) with the automatic linefeed on causes the printer to print one line of data then advances the paper one line. A carriage return with the automatic linefeed off prints a line of data without causing the paper to advance.

If you're using BASIC, a line feed is added after every LPRINT statement unless it ends within a semicolon (;). Therefore, LPRINT CHR\$(13) = CR + LF and LPRINT CHR\$(13); = CR only.

NOTE: Internal switch 6 must be ON for an automatic linefeed to occur when a carriage return is sent. (See page 19.)

Home Printhead	Decimal	ASCII
Home printhead	27 60	ESC <

When this command is sent, the printhead returns to the leftmost position on a page and prints the next line unidirectionally from left to right. This affects one line only; then bidirectional printing is restored.

Printhead Direction	Decimal	ASCII
Unidirectional	27 85 1	ESC U 1
Bidirectional	27 85 0	ESC U 0

To obtain a more accurate left margin for lining up rows, switch to unidirectional printing so that the printhead prints from left to right only. To resume normal bidirectional printing and increase speed, send the CHR\$(27);"U";CHR\$(0) command.

Printing Speed	Decimal	ASCII
Half-speed printing	27 115 1	ESC s 1
Resume normal speed	27 115 0	ESC s 0

Half-speed printing is available in utility mode (see Print Quality, page 49); it reduces the noise level of the printer by reducing the speed by 50 per cent. To resume normal speed, send the CHR\$(27);"s";CHR\$(0) command.

Backspace	Decimal	ASCII
Backspace	8	BS

When the backspace command is received, the printer prints the data in the buffer and moves the printhead one character to the left to position itself to print the next character. You can use a backspace to create special symbols through a combination of characters. For example the cent sign (¢) could be created by printing a lowercase c, backspacing then printing the slash character /:

```
LPRINT "c";CHR$(8);"/"
```

A backspace is performed in the current character size setting regardless of size changes in the line. If the printer is in double width, a backspace command will move the printhead two character spaces to the left. The backspace command is ignored unless it's followed by a character, a space or another backspace command.

A backspace isn't performed immediately. It's executed when a character or print command is received.

Delete	Decimal	ASCII
Delete a character	127	DEL

Deletes the last character in the print buffer. It won't delete an already printed character.

NOTE: This command won't work with graphics characters.

Controlling Forms

The following commands let you change the length, width and format of a printed page.

Line Spacing	Decimal	ASCII
Perform a line feed	10	LF
Set 6 lpi	27 50	ESC 2
Set 8 lpi	27 48	ESC 0
Set 7/72" lpi	27 49	ESC 1
Set n/72" lpi	27 65 n	ESC A n
Set n/216" lpi	27 51 n	ESC 3 n
Perform n/216" line feed	27 74 n	ESC J n

NOTE: n/72": n=0 to 85
n/216": n=0 to 255

Sending a line feed command makes the printer advance the paper one line. The standard line spacing is 6 lines per inch (lpi). You can reset the line spacing to 8 lpi by sending the CHR\$(27);"0" command or to a multiple of n/72" or n/216" for special applications, like graphics. For example, the following BASIC statement sets the printer for 1/2" (36/72") line spacing:

```
LPRINT CHR$(27);"A";CHR$(36)
```

For a single fine line feed, use the n/216" command, CHR\$(27);"J";CHR\$(n). This command causes the printer to perform the requested line feed but doesn't change the current line space setting. If you want to set the fine line spacing for an entire document, use the other n/216" command, CHR\$(27);"3";CHR\$(n).

Forms Control	Decimal	ASCII
Form feed	12	FF
Form length in inches	27 67 0 n	ESC C 0 n
Form length in lines	27 67 n	ESC C n

NOTE: For the form length in inches command, n is the number of inches on the form from 1 to 22.

For the form length in lines command, n is the number of lines on the form from 1 to 127.

When you send a form feed command, the printer advances to the top of the next page. The length of the page is determined by the setting of an internal switch (see page 19 for more details) or by giving either of the form length commands.

To program the form length by inches use the `CHR$(27);"C";CHR$(0);CHR$(n)` command where `n` is the number of inches from 1 to 22. For example, the following statement sets an 8 inch form:

```
LPRINT CHR$(27);"C";CHR$(0);CHR$(8)
```

If you know the length of the form by lines, use the `CHR$(27);"C";CHR$(n)` command where `n` is the number of lines from 1 to 127. To program the printer for a form with 65 lines, use this statement:

```
LPRINT CHR$(27);"C";CHR$(65)
```

Margins	Decimal	ASCII
Set right margin	27 81 n	ESC Q n
Set left margin	27 108 n	ESC I n

NOTE: See explanations below for the values of `n`.

These two margin commands let you start and end printing at specified distances from the left side of a page. You program these distances in columns. Both margins operate by converting the value of `n` to an absolute position on the page and remain in effect until another margin is set, regardless of changes in character pitch.

For example, if you're in 10 cpi and set the left margin to one inch with `ESC I CHR$(10)` and later you switch to 12 cpi, the margin will still be one inch—you don't have to reset the margin to `ESC I CHR$(12)` to keep an even left margin. Likewise, if you're in 12 cpi and set a right margin of 96, and then later you switch to 10 cpi, the margin remains at the position marked by column 96 at 12 cpi.

Below are the standard margin settings using one inch margins for each character size.

Character Size	Left Margin	Right Margin
10 cpi	10	70
12 cpi	12	84
17 cpi	17	128
20 cpi	20	140

The following table shows the range of values for left and right margins at different character sizes. The right margin must be greater than the left margin.

Character Size	Left Margin	Right Margin
10 cpi	0 to 78	2 to 80
12 cpi	0 to 93	3 to 96
17 cpi	0 to 133	4 to 137
20 cpi	0 to 156	4 to 160

NOTE: Always put the left margin command at the beginning of a line, because it will delete anything that comes before it on the line. This command will also clear horizontal tab stops to the default setting (every eight spaces).

Horizontal Tabs

	Decimal	ASCII
Set by columns	27 68 n1...nk 0	ESC D n1...nk NUL
Clear tabs	27 68 0	ESC D NUL
Skip to next tab	9	TAB

NOTE: n1 to nk are column positions of the tab stop. You may set up to 32 tab stops. Values depend on character size; see chart for details.

Up to 32 horizontal tabs can be set with the CHR\$(27);"D";CHR\$(n1) command. The ranges of possible column positions at each character size are given in the chart below. The tab settings must be given in ascending order and once all the tabs are given, the command is ended with CHR\$(0).

Character size	Range of tab column positions
10 CPI	1 to 80
12 CPI	1 to 96
17 CPI	1 to 137
20 CPI	1 to 160

The position of the tabs will not change even if you change character size later in the document. For example, if you're in 10 cpi and you set tabs at columns 10, 20 and 30 then later you switch to 12 cpi, the tabs will still be spaced an inch apart (10 columns at 10 cpi) even though there are now 12 characters per inch instead of 10 characters per inch.

When you turn the printer on, tabs are set at every 8th column as the default. Tabs are reset to the default if the left margin is changed.

When the CHR\$(9) command is given, the printhead skips to the next available tab setting. If no tabs were assigned by the horizontal tab command, the printhead will skip 8 columns as the default.

The printer will not underline spaces created by horizontal tabs.

Skip Over Perforation

	Decimal	ASCII
Auto skip by lines	27 78 n	ESC N n
Stop auto skip	27 79	ESC O

NOTE: n is the distance skipped from 1 to 127 lines.

The skip over perforation or auto skip command causes the printer to automatically advance to the top of the next page when there's a predetermined amount of lines remaining at the bottom of a page. Once set, the distance skipped doesn't change, even if line spacing does.

The last line that can be printed prior to the skip is determined by adding 1 to the value of n then subtracting the total from the form length setting. For example, if your form length is 66 lines and n is 10 then the last line to print is 55.

While this feature is handy for program listings and printouts from software packages that have no forms control, we advise against using it with packages that do as it is likely to interfere with the software and ruin your page format. To turn off auto skip, send the CHR\$(27);"O" command.

Miscellaneous Functions

Paper-Out Sensor

	Decimal	ASCII
Paper sensor OFF	27 56	ESC 8
Paper sensor ON	27 57	ESC 9

There are sensors in your printer that detect when paper is low so that whenever the printer comes within one inch of the bottom of the last sheet, printing stops and the alarm light comes on. By deactivating these sensors, you can print on the last inch of the page. The alarm light will go on, and the printer will stop at the next top of form.

The paper sensors are automatically reactivated whenever the form length is changed or the printer is turned off.

NOTE: If the sensor is off, be careful not to damage the printhead by printing on the platen.

Reset	Decimal	ASCII
Reset	27 64	ESC @
Cancel	24	CAN

The reset command, CHR\$(27);"@", is a printer initialization command which clears the buffer of all data and resets the printer's default settings. Top of page is also cleared and set to the current printhead position.

The cancel command, CHR\$(24), clears the print buffer but leaves all control codes, except double width, in effect.

Print Suppress Mode	Decimal	ASCII
Print suppress on	19	DC3
Print suppress off	17	DC1

When print suppress mode is in effect, the printer ignores all data and control codes, except the print suppress off command, CHR\$(17). The SELECT light flashes when the printer is in this mode.

When the print suppress off command is sent, the printer will accept data from the computer and the SELECT lamp will stop flashing. Print suppress mode cannot be activated or deactivated from the SELECT button on the front panel.

8th Bit Control	Decimal	ASCII
Set 8th bit to 1	27 62	ESC >
Set 8th bit to 0	27 61	ESC =
Read from computer	27 35	ESC #

You can set the 8th bit, or the most significant bit (MSB), as it is also known, to either 1 or 0. When the 8th bit is set to 1, the range of CHR\$ codes is limited to 128-255. When the 8th bit is set to 0, the range of CHR\$ codes is limited to 0-127.

You can also send the CHR\$(27);"# to accept the 8th bit as is from the computer for access to the entire range (0-255) of ASCII characters. This command cancels the other MSB commands.

Printing Graphics

The OKIDATA 180's graphics capabilities let you print charts, graphs and pictures just like a newspaper photograph, using thousands of tiny dots. That's right, thousands. And each graphic can be printed in a variety of ways—half-speed, full speed, single density, double density, quadruple density—so if you're the least bit intimidated, we recommend that you purchase a software program that makes everything a whole lot simpler. However, if you live for a challenge, here's what you'll need to know to program a graphic image yourself.

Graphics	Decimal	ASCII
Select graphics mode	27 42 m n1 n2	ESC * m n1 n2
Select single density	27 75 n	ESC K n
Select half speed	27 76 n	ESC L n
Select full speed	27 89 n	ESC Y n
Select quadruple density	27 90 n	ESC Z n
Select 9-pin graphics	27 94 m n	ESC ^ m n
Reassign alternate codes	27 63 m n	ESC ? m n

The software control for graphics comes from both the control codes listed above and the graphics data sent from the computer. Before we discuss the control codes, let's take a look at the structure of graphics data.

Graphics data, like all other data sent to the printer, consists of a series of bytes. Each of the eight bits in a byte of graphics data corresponds to one pin on the printhead. A bit's value can be either 1 or 0. When the printer receives the data, it interprets a bit with a value of 1 as a command to fire the corresponding pin. Bits that are set to 0 do not cause pins to fire. Each byte of graphics data results in a column, 8 dots high, of printed dots and blank spaces.

Instead of sending the data to the printer bit by bit, you will probably want to convert this binary information into decimal or hexadecimal format for use with your programming language. In the figure below, we show how to determine the decimal value for a given pattern of bits/pins.

128	<input checked="" type="checkbox"/>	128 X 1 =	128
64	<input checked="" type="checkbox"/>	64 X 1 =	64
32	<input type="checkbox"/>	32 X 0 =	0
16	<input checked="" type="checkbox"/>	16 X 1 =	16
8	<input type="checkbox"/>	8 X 0 =	0
4	<input checked="" type="checkbox"/>	4 X 1 =	4
2	<input checked="" type="checkbox"/>	2 X 1 =	2
1	<input checked="" type="checkbox"/>	1 X 1 =	1
			<hr/>
Total:			215

Pin not fired ☐

Pin fired ☒

NOTE: Adjacent horizontal dots are not printed in the High-Speed Double Density or Quadruple-Density modes.

Writing the Program

Before your printer can interpret the graphics data, you must send it the command that puts it into graphics mode:

ESC * m n1 n2

For m, substitute the density code for the graphics mode you want to use:

Mode	Density code	Density (Dots Per Inch)
Single-Density	0	60 dpi
Low-Speed Double-Density	1	120 dpi
High-Speed Double-Density	2	120 dpi
Quadruple-Density	3	240 dpi
Epson QX-10	4	80 dpi
One to one plotter	5	72 dpi
Other CRT screens	6	90 dpi
Double density plotter	7	144 dpi

Next you must specify the number of columns of graphics you will be printing. To print our example, a square followed by 2 blank columns, we will need 8 columns. We will be printing a row of 6 squares, however, so the total number of graphics columns is 48 (6 x 8).

This information is given in the two variables n1 and n2. If your pattern consists of fewer than 256 columns, replace n1 with the number of columns, and assign n2 the value 0. For patterns with 256 columns or more, n2 represents the number of 256-column groups in the pattern, while n1 is the number of single columns left over when all the 256-column groups have been accounted for. In our example of a 48-column pattern, n1 is 48 and n2 is 0.

$$\begin{array}{r}
 0 = n2 \\
 256 \overline{)48} \\
 \underline{0} \\
 48 = n1
 \end{array}$$

The diagram below illustrates our graphics pattern:

128	○	○	○	○	○	○		
64	○					○		
32	○					○		
16	○					○		
8	○					○		
4	○					○		
2	○					○		
1	○	○	○	○	○	○		
	255	129	129	129	129	255	0	0

When the graphic bytes you specify have all been read, your printer switches out of the graphics mode automatically.

The listing below is the BASIC program that generates a row of 6 boxes in Single Density graphics. To print the same pattern at another density, change the value of D in line 10 to one of the density codes in the table above.

```

10 D=0
20 REM D is the density code. Change its value for other densities.
30 LPRINT CHR$(27);"@" : 'Reset (initialize) printer
40 LPRINT CHR$(27);"**";CHR$(D);CHR$(48);CHR$(0);
60 REM CHR$(D) is the density; in this case D=0 for single density
70 REM CHR$(48) and CHR$(0) indicate the number of columns: 48=48+(0*256)
80 FOR I=1 TO 6 : 'Repeat box pattern 6 times
90 FOR J=1 TO 8 : 'Box is made of 8 columns
100 READ A : 'Read the byte of data for the column
110 LPRINT CHR$(A); : 'Send the data to the printer
120 NEXT J : 'Next column
130 RESTORE : 'Go through data statement again
140 NEXT I : 'Next box
150 DATA 255, 129, 129, 129, 129, 255, 0, 0
160 END

```

□□□□□□

Usually, you will use the standard ESC * m n1 n2 command to enter one of the graphics modes. However, there are shorter alternative commands for four of the modes:

	Decimal	ASCII
Single-Density	27 75 n1 n2	ESC K n1 n2
Low-Speed Double-Density	27 76 n1 n2	ESC L n1 n2
High-Speed Double-Density	27 89 n1 n2	ESC Y n1 n2
Quadruple-Density	27 90 n1 n2	ESC Z n1 n2

Reassigning Graphics Commands

You can reassign any of the graphics modes to one of the alternative commands (ESC K, ESC L, ESC Y, or ESC Z) with the command: `CHR$(27);"?";CHR$(n);CHR$(m)`. For *n*, substitute the decimal value of one of the four letters (K, L, Y, or Z) used in the alternative commands. (You can also use the literal characters in quotes: `CHR$(27);"?L";CHR$(m)`.) This indicates which of the alternative commands you are redefining. The variable *m* stands for the density code (from the table on page 66) of the mode that you are reassigning to an alternative command. For example, to reassign the Double Density Plotter mode (density code 7) to the command ESC L *n1 n2*, use the following statement:

```
LPRINT CHR$(27);"?L";CHR$(7)
```

9-Pin Graphics

Select graphics mode

Decimal

27 94 *m*
n1 n2

ASCII

ESC ^ *m*
n1 n2

As its name suggests, the 9-pin graphics mode uses a column of nine dots to print graphics images, instead of eight. This mode lets you print slightly more detailed graphics, although it is also more complicated to use than the standard 8-pin graphics. Just like 8-pin graphics, you need to specify the density code (*m*) and the size of the image in columns (*n1,n2*). Refer to the table on page 66 for available density codes.

Next you specify the number of columns of graphics you'll be printing. This information is given in the two variables *n1* and *n2*. If your pattern consists of fewer than 256 columns, replace *n1* with the number of columns, and assign *n2* the value 0. For patterns with 256 columns or more, *n2* represents the number of 256-column groups in the pattern, while *n1* is the number of single columns left over when all the 256-column groups have been accounted for. For example, if your graphic is made up of 300 columns, *n2* will equal 1, and *n1* will equal 44. Design your image just as you would for 8-pin graphics, but allow for 9 dots per column. Since there are only 8 bits in a byte, you will need two bytes to specify a single column of 9-pin graphics data. The first byte gives the first eight dots in the column. For the 9th dot, only the most significant bit of the data byte is used. If you want this bit to print, send any value from 128 to

255; if you want to leave a white space instead of a printed dot, send a value from 0 to 127.

The diagram below illustrates the structure of 9-bit graphics data:

A Column of 9-Bit Graphics Data

128	<input type="checkbox"/>	128 X 0 =	0
64	<input checked="" type="checkbox"/>	64 X 1 =	64
32	<input checked="" type="checkbox"/>	32 X 1 =	32
16	<input type="checkbox"/>	16 X 0 =	0
8	<input checked="" type="checkbox"/>	8 X 1 =	8
4	<input checked="" type="checkbox"/>	4 X 1 =	4
2	<input type="checkbox"/>	2 X 0 =	0
1	<input checked="" type="checkbox"/>	1 X 1 =	1

Total: 109

<input checked="" type="checkbox"/>	128 X 1 =	128
<input type="checkbox"/>		
<input type="checkbox"/>		
<input type="checkbox"/>		
<input type="checkbox"/>		
<input type="checkbox"/>		
<input type="checkbox"/>		

Total: 128 (or more)

Pin not fired ☐

Pin fired ☒

NOTE: Although you are using two bytes for data, remember that n1 and n2 in the select 9-pin graphics command specify the number of columns of graphics, not the number of bytes.

Appendix A: Commodore Control Codes

Function	Code	Decimal	Hexadecimal
Character format			
10 cpi	SI	15	0F
12 cpi	FS	28	1C
17.1 cpi	GS	29	1D
Subscript	ESC L	27 76	1B 4C
Turn off subscript	ESC M	27 77	1B 4D
Superscript	ESC J	27 74	1B 4A
Turn off superscript	ESC K	27 75	1B 4B
Enhanced	ESC H	27 72	1B 48
Emphasized	ESC T	27 84	1B 54
Turn off emphasized/enhanced	ESC I	27 73	1B 49
Double width	SO	14	0E
Turn off double width		129	81
Cursor up character set	CURSOR UP	145	91
Cursor down character set	CURSOR DOWN	17	11
Foreign language character set n=64 to 67	ESC ! n	27 33 n	1B 21 n

Function	Code	Decimal	Hexadecimal
Page format			
Set left margin by character columns 10 cpi: nn=00 to 79 12 cpi: nn=00 to 95	POS nn	16 nn	10 nn
Set left margin by dot columns n1=0 to 3 n2=0 to 255	ESC POS n1 n2	27 16 n1 n2	1B 10 n1 n2
Set form length nn=01 to 99	ESC F nn	27 70 nn	1B 46 nn
Form feed	FF	12	0C
One-inch auto skip over perforation	ESC A	27 65	1B 41
Turn off auto skip over perforation	ESC B	27 66	1B 42
Line spacing			
1/6" line spacing	ESC 6	27 54	1B 36
1/8" line spacing	ESC 8	27 56	1B 38
n/144" line feed n=0 to 255	ESC LF n	27 10 n	1B 0A n
n/144" line spacing n=0 to 255	ESC V n	27 86 n	1B 56 n
Line feed	LF	10	0A

Function	Code	Decimal	Hexadecimal
Printing features			
Utility printing	ESC 0	27 48	1B 30
NLQ printing	ESC 1	27 49	1B 31
High-speed draft	ESC (1	27 40 49	1B 28 31
Underline	ESC C	27 67	1B 43
Turn off underline	ESC D	27 68	1B 44
Inverse printing	DC2	18	12
Turn off inverse printing	RVS OFF	146	92
Graphics			
Enter bit image graphics mode	BS	8	08
Normal density bit image graphics	ESC P	27 80	1B 50
High density bit image graphics	ESC Q	27 81	1B 51
Repeat graphics data n=0 to 255	SUB n	26 n	1A n
Utility commands			
Cancel function	CAN	24	18
Paper-out detection n=1: disabled n=0: enabled	ESC E n	27 69 n	1B 45 n
Carriage return with line feed	CR	13	0D
Carriage return without line feed		141	8D



Appendix B: Epson Control Codes

Function	Code	Decimal	Hexadecimal
Character format			
10 cpi	ESC P	27 80	1B 50
12 cpi	ESC M	27 77	1B 4D
Condensed printing	SI or ESC SI	15 or 27 15	0F or 1B 0F
Turn off condensed printing	DC2	18	12
Sub-/superscript n=1: subscript n=0: superscript	ESC S n	27 83 n	1B 53 n
Turn off sub-/superscript	ESC T	27 84	1B 54
Emphasized	ESC E	27 69	1B 45
Turn off emphasized	ESC F	27 70	1B 46
Enhanced	ESC G	27 71	1B 47
Turn off enhanced	ESC H	27 72	1B 48
Double width n=0: double width off n=1: double width on	ESC W n	27 87 n	1B 57 n
One-line double width	SO or ESC SO	14 or 27 14	0E or 1B 0E
Turn off one-line double width	DC4	20	14
Italics	ESC 4	27 52	1B 34
Turn off italics	ESC 5	27 53	1B 35

Function	Code	Decimal	Hexadecimal
Select foreign character set n=0 to 11	ESC R n	27 82 n	1B 52 n
Page format			
Set horizontal tab stops by column	ESC D n1...nk NUL	27 68 n1...nk 0	1B 44 n1...nk 00
Horizontal tab	HT	9	09
Set left margin by column	ESC I n	27 108 n	1B 6C n
Set right margin by column	ESC Q n	27 81 n	1B 51 n
Set form length in inches n=1 to 22	ESC C 0 n	27 67 0 n	1B 43 00 n
Set form length in lines n=1 to 127	ESC C n	27 67 n	1B 43 n
Auto skip over perforation n=1 to 127	ESC N n	27 78 n	1B 4E n
Cancel auto skip over perforation	ESC O	27 79	1B 4F
Carriage movement			
Carriage return	CR	13	0D
Backspace	BS	8	08
Delete one character	DEL	127	7F
Form feed	FF	12	0C

Function	Code	Decimal	Hexadecimal
Line spacing			
Line feed	LF	10	0A
1/8" line spacing	ESC 0	27 48	1B 30
7/72" line spacing	ESC 1	27 49	1B 31
1/6" line spacing	ESC 2	27 50	1B 32
n/72" line spacing n=0 to 85	ESC A n	27 65 n	1B 41 n
n/216" line spacing n=0 to 255	ESC 3 n	27 51 n	1B 33 n
n/216" line feed n=0 to 255	ESC J n	27 74 n	1B 4A n
Printing features			
High speed draft	ESC (0	27 40 48	1B 28 30
Underline n=0: underline off n=1: underline on	ESC - n	27 45 n	1B 2D n
Select print quality n=0: Utility n=1: NLQ	ESC x n	27 120 n	1B 78 n
Select print mode n=0 to 255	ESC ! n	27 33 n	1B 21 n

Function	Code	Decimal	Hexadecimal
Graphics			
Select graphics mode m=0 to 7 n1,n2=0 to 255	ESC * m n1 n2	27 42 m n1 n2	1B 2A m n1 n2
Single density graphics n1=0 to 255 n2=0 to 7	ESC K n1 n2	27 75 n1 n2	1B 4B n1 n2
Half-speed double density graphics n1=0 to 255 n2=0 to 7	ESC L n1 n2	27 76 n1 n2	1B 4C n1 n2
Full-speed double density graphics n1=0 to 255 n2=0 to 7	ESC Y n1 n2	27 89 n1 n2	1B 59 n1 n2
Quadruple density graphics n1=0 to 255 n2=0 to 7	ESC Z n1 n2	27 90 n1 n2	1B 5A n1 n2
9-pin bit image graphics m=0 to 3 n1=0 to 255 n2=0 to 7	ESC ^ m n1 n2	27 94 m n1 n2	1B 5E m n1 n2
Reassign alternate graphics codes m="K", "L", "Y" or "Z" n=0 to 7	ESC ? m n	27 63 m n	1B 3F m n

Function	Code	Decimal	Hexadecimal
Utility commands			
Reset	ESC @	27 64	1B 40
Cancel function	CAN	24	18
Print suppress	DC3	19	13
Turn off print suppress	DC1	17	11
Set 8th data bit to 1	ESC >	27 62	1B 3E
Set 8th data bit to 0	ESC =	27 61	1B 3D
Read 8th data bit as it comes from computer	ESC #	27 35	1B 23
Enable paper-out detector	ESC 9	27 57	1B 39
Disable paper-out detector	ESC 8	27 56	1B 38
Home printhead, print one line unidirectional	ESC <	27 60	1B 3C
Unidirectional printing n=0: Print bidirectional n=1: Print unidirectional	ESC U n	27 85 n	1B 55 n
Half speed printing n=0: Normal speed n=1: Half speed	ESC s n	27 115 n	1B 73 n

Appendix C: Commodore ASCII Table

Cursor up mode

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37
														!	"	#	\$	%
38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56
&	'	(	)	*	+	,	-	.	/	0	1	2	3	4	5	6	7	8
57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75
9	=	;	<	=	>	?	@	A	B	C	D	E	F	G	H	I	J	K
76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94
L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	[&]	↑
95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113
←	---	⬆	|	---	---	---	---	|	|	↘	↘	↘	L	↘	↘	└	└	●
114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130	131	132
—	⬆	|	/	X	O	⬆	|	⬆	+	⊞	|	π	▲					

Commodore ASCII Table

Cursor up mode (continued)

133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150	151
152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170
									■	▬	▬	▬	▬	▬	▬	▬	▬	▬
171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189
┐		┐	┐	▬	┐	┐	┐	┐	┐	┐	┐	┐	┐	┐	┐	┐	┐	┐
190	191	192	193	194	195	196	197	198	199	200	201	202	203	204	205	206	207	208
┐	┐	┐	┐	┐	┐	┐	┐	┐	┐	┐	┐	┐	┐	┐	┐	┐	┐	┐
209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227
┐	┐	┐	┐	┐	┐	┐	┐	┐	┐	┐	┐	┐	┐	┐	┐	┐	┐	┐
228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246
┐	┐	┐	┐	┐	┐	┐	┐	┐	┐	┐	┐	┐	┐	┐	┐	┐	┐	┐
247	248	249	250	251	252	253	254	255										
┐	┐	┐	┐	┐	┐	┐	┐	┐										

Commodore ASCII Table

Cursor down mode

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37
														!	"	#	\$	%
38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56
&	'	(	)	*	+	,	-	.	/	0	1	2	3	4	5	6	7	8
57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75
9	:	;	<	=	>	?	@	a	b	c	d	e	f	g	h	i	j	k
76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94
l	m	n	o	p	q	r	s	t	u	v	w	x	y	z	[]	^	
95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113
←	—	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130	131	132
R	S	T	U	V	W	X	Y	Z	+	=	|	×	÷					

Commodore ASCII Table

Cursor down mode (continued)

133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150	151
152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170
									■	▬	▬	▬	▬	▬	▬	▬	▬	▬
171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189
┐	■	┐	┐	▬	┐	┐	┐	┐	┐	■	■	▬	▬	▬	▬	▬	▬	▬
190	191	192	193	194	195	196	197	198	199	200	201	202	203	204	205	206	207	208
▬	▬	▬	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227
Q	R	S	T	U	V	W	X	Y	Z	+	▬	▬	▬	▬	▬	▬	▬	▬
228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246
▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬
247	248	249	250	251	252	253	254	255										
▬	▬	▬	▬	▬	▬	▬	▬	▬										



Appendix D: Epson ASCII Table

HEX	DEC	CHAR
00	0	NUL
01	1	SOH
02	2	STX
03	3	ETX
04	4	EOT
05	5	ENQ
06	6	ACK
07	7	BEL
08	8	BS
09	9	HT
0A	10	LF
0B	11	VT
0C	12	FF
0D	13	CR
0E	14	SO
0F	15	SI
10	16	DLE
11	17	DC1
12	18	DC2
13	19	DC3
14	20	DC4
15	21	NAK
16	22	SYN
17	23	ETB
18	24	CAN
19	25	EM
1A	26	SUB
1B	27	ESC
1C	28	FS
1D	29	GS
1E	30	RS
1F	31	US
20	32	SPACE
21	33	!
22	34	"
23	35	#
24	36	\$
25	37	%
26	38	&
27	39	5
28	40	(
29	41)
2A	42	*

HEX	DEC	CHAR
2B	43	+
2C	44	,
2D	45	-
2E	46	.
2F	47	/
30	48	0
31	49	1
32	50	2
33	51	3
34	52	4
35	53	5
36	54	6
37	55	7
38	56	8
39	57	9
3A	58	:
3B	59	;
3C	60	<
3D	61	=
3E	62	>
3F	63	?
40	64	@
41	65	A
42	66	B
43	67	C
44	68	D
45	69	E
46	70	F
47	71	G
48	72	H
49	73	I
4A	74	J
4B	75	K
4C	76	L
4D	77	M
4E	78	N
4F	79	O
50	80	P
51	81	Q
52	82	R
53	83	S
54	84	T
55	85	U

HEX	DEC	CHAR
56	86	V
57	87	W
58	88	X
59	89	Y
5A	90	Z
5B	91	[
5C	92	\
5D	93]
5E	94	^
5F	95	_
60	96	`
61	97	a
62	98	b
63	99	c
64	100	d
65	101	e
66	102	f
67	103	g
68	104	h
69	105	i
6A	106	j
6B	107	k
6C	108	l
6D	109	m
6E	110	n
6F	111	o
70	112	p
71	113	q
72	114	r
73	115	s
74	116	t
75	117	u
76	118	v
77	119	w
78	120	x
79	121	y
7A	122	z
7B	123	{
7C	124	|
7D	125	}
7E	126	~
7F	127	DEL



Appendix E: Specifications

Print speed

Utility	120 cps
Draft	144 cps @ 10 and 17.1 cpi
	180 cps @ 12 cpi
NLQ	30 cps

Characters Per Line

at 10 cpi	80
at 12 cpi	96
at 17.1 cpi	137
at 20 cpi (Epson only)	160

Electrical Characteristics

Voltage	120V AC \pm 10%
	220/240V AC \pm 10%

Reliability

Mean Time Between Failures (MTBF)	4000 hours at 25% duty cycle, 35% page density
Mean Time To Repair (MTTR)	15 minutes
Printhead life	200 million characters

Physical Dimensions

Size	14.2 in (360 mm) wide
	10.8 in (275 mm) deep
	3.2 in (80 mm) high
Weight	9.9 lb (4.5 kg)

Ribbon Life

3 million characters

Paper Specifications

Number of copies	Original plus 3 copies
Weight	16 to 24 lb.

Specifications subject to change without notice.



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Federal Communications Commission Radio Frequency Interference Statement

WARNING: This equipment complies with the limits for a Class B computing device in accordance with the specifications in Subpart J of Part 15 of FCC rules. These specifications are designed to minimize radio frequency interference in a residential installation; however, there is no guarantee that radio or television interference will not occur in any particular installation. If this equipment does cause interference to radio or television reception, which can be determined by turning the equipment off and on when the radio or television is on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient the radio or television receiving antenna.
- Relocate the printer with respect to the receiver.
- Move the printer away from the receiver.
- Plug the printer into a different outlet so that the printer and receiver are on different circuits.

If necessary, the user should consult the dealer or an experienced radio/television technician for additional suggestions. The user may find the following booklet prepared by the Federal Communication Commission helpful:

"How to Identify and Resolve Radio/TV Interference Problems"

This booklet is available from the U.S. Government Printing Office, Washington, DC 20402 by ordering stock number 004-000-00345-4.

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